UNIVERSITY OF TASMANIA

The Strategic Role of Australian Regional Ports in Regional Development

by

Quazi Mohammed Habibus Sakalayen
B.Sc. (Honours-Physics, DU, Bangladesh), M.Sc. (Physics, DU, Bangladesh), M.Sc. (Maritime affairs specialization in Shipping Management, WMU, Sweden)

Department of Maritime and Logistics Management
National Centre for Ports and Shipping
Australian Maritime College
University of Tasmania
Australia

Submitted in partial fulfilment of the requirements for the Degree of Doctor of Philosophy
University of Tasmania
June 2014

DECLARATION OF ORIGINALITY

This thesis contains no material which has been accepted for a degree or diploma by the University or any other institution, except by way of background information and duly acknowledged in the thesis, and to the best of my knowledge and belief no material previously published or written by another person except where due acknowledgement is made in the text of the thesis, nor does the thesis contain any material that infringes copyright.

Quazi Mohammed Habibus Sakalayen

Date:

STATEMENT OF AUTHORITY OF ACCESS

This thesis may be made available for loan and limited copying and communication in accordance with the Copyright Act 1968.

Quazi Mohammed Habibus Sakalayen

Date:

ABSTRACT

Despite an increase in worldwide research on the relationship between ports and their regions, studies have mainly centred on hub ports or major container ports and less attention has been paid to regional ports in the national context. In this thesis, regional ports are defined as ports located outside metropolitan cities, which facilitate regional trade and serve regional producers and businesses. Australian regional ports perform approximately 85% of the national freight task, and have immense strategic potential for regional development. Despite the symbiotic relationship between regional ports and their host regions this area has not been widely researched. This thesis explores strategies for Australian regional ports to make an effective contribution to regional development.

This study has adopted a mixed methods research methodology, consisting of semi-structured telephone interviews in the qualitative strand, and a web-based survey in the quantitative strand. The outcome of the telephone interviews led to the development of a conceptual model for Australian regional ports' contribution to regional development, consisting of three major themes: port sustainability, building on collaborative advantages and active participation of ports in a regional innovation system. Subsequently, an instrument was developed to conduct a web-based survey in the quantitative strand. The empirical results from the survey revealed four pertinent factors with their corresponding strategic initiatives important for Australian regional ports' involvement in regional development. These factors were ports being interactive and entrepreneurial in the regional innovation system (RIS), collaboration for supply chain efficiency, collaboration with other regional organisations, and ports being proactive for environmental challenges and social responsibility. Pulling together the findings from both strands, the research advocates a place based approach for Australian regional ports to be effectively involved in regional development. This approach is inclusive

and collaborative and addresses the issues involved in generating greater policy benefits for a specific place. The place based approach significantly relates to the research findings where systematic regional resource utilisation is important.

Academically, the research contributes to revealing the geo-dimensional role (regional enabler) of ports in regional development. It highlights the ways in which ports can actively engage in regional resource configuration efforts with other regional organisations in an interactive, innovative and entrepreneurial way. The findings also have implications for port management, by producing a place oriented port matrix consisting of economic, social, environmental and spatial dimensions for effective regional development involvement; by generating a set of relevant indicators for performance monitoring and reporting; and by gradually introducing a new type of port planning which focuses on collaboration, innovation, and regional resource configuration.

ACKNOWLEDGEMENTS

I am grateful to the Almighty, through whom all things are possible. This dissertation could not have been completed without the support and encouragement of my many well-wishers, to whom I would like to express my thanks.

Firstly, I would like to thank my respected primary supervisor Dr Peggy Shu-Ling Chen for her generous and responsible guidance, constructive suggestions and excellent mentoring. I am indeed grateful for her partnership and endless support throughout my journey.

I acknowledge my gratitude to my honourable co-supervisor Dr Stephen Cahoon for extending me the opportunity to pursue this PhD in the first place. His endless support, encouragement, mentoring and insightful feedback during this noble journey were incomparable.

I am truly grateful to my first Graduate Research Coordinator and Senior Research Fellow Dr Benjamin Brooks for arranging a scholarship, providing guidance, sharing research nitty-gritty and giving quality time along the way. I owe to both of my supervisors and Dr Brooks.

I wish to thank the Director of the National Centre for Ports and Shipping Professor Dev Ranmuthugala, my current Graduate Research Coordinator Dr Hong-Oanh (Owen) Nguyen, Ms Hilary Pateman, Dr Jiangang Fei, Mr Prashant Bhaskar, Mr Peter Cain, Ms Alison James, Mr Colin Kittel, Ms Judy Cress-Morris, Dr Elizabeth Vagg, Dr Vikram Garaniya and all the academics of the Maritime and Logistics Management (MLM) Department at the Australian Maritime College, and the University of Tasmania for extending their kind suggestions and support during my research. Additional thanks to Dr Eon-Seong Lee for our discussion during data analysis.

I would like to express my profound gratitude to Captain Vic Justice for our many discussions about Australian regional ports and for supporting me during the data collection. Many thanks to Dr Markus Bowles for sourcing references during data collection.

Thanks to all staff of the Maritime and Logistics Management Department, including Ms Lee-Anne Britcliffe, Ms Claire Gregory, Ms Jackie Evans, and Ms Heather Hepburn for providing excellent executive support throughout the research process. Thanks to all the telephone interview participants and web survey respondents for sharing their insights and thoughts without which the empirical side of this research would not have been completed.

Special thanks goes to all of my research colleagues Saut Gurning, Indika Sigera, Hai Thanh Tran, Imanuel Dindin, Yapa Mahinda Bandara, Cecile L'Hermitte, Livingstone Caesar, Hadi Ghaderi, Jagan Jeevan, Lidong Fan, Peter Fanam, Nirman Jayarathne, Jalal Rafie Shahraki, Dr Md Nurul Amin, TM Rabiul Islam, Nagi Abdussamie, Shah Md Abu Emran, Mir Md Jahangir Kabir, Md Ariful Islam, Bappy Golder, Tazul Islam Khan, Khandakar Usayed Mahmood and all researchers in the AMC research hub and their family for making the PhD research life a much more enjoyable one.

I would like to thank Ms Dianne Hazelwood for being so helpful and for extending her support during the initial stages of my research. I would also like to thank Ms Caroline Deakin for assisting me during the editing stage of this thesis.

Special gratitude goes to my mother (Moujuda Khatun), sister (Kazi Mahnoor Begum) and brothers (Kazi Md. Nurul Mohaymen and Kazi Md. Mostofa Azmaine) and to my extended family, including my father-in-law,

brother-in-law, aunt and cousins for encouraging me to be a researcher. Behind all my stories is my caring mother who raised me and who had a ‘PhD in Mothering’. My undying respect goes to you Mum. I also recall the smiling face of my father (Quazi Wajih Mohammed) in front of others whenever I had achieved something. But this time I didn’t have the opportunity to see his bright smiling face. I believe he is still smiling from heaven. Thanks to you, your silent inspiration made me into a dreamer.

I owe a debt of gratitude to my wife Farah Mehreen and my daughter Quazi Tazkia Armeen for their continuous encouragement to reach to this ultimate academic destination. Their patience and unending support in every aspect of my life has been my inspiration to continue my journey in lifelong learning and has given me the power to withstand the difficult times. You have helped me to become a better person as I have undertaken this venture. Thank you very much for everything. I love you both.

Finally, I dedicate this doctoral thesis to my parents, to my lovely wife and to my wonderful, gorgeous daughter.

LIST OF ABBREVIATIONS

3BL	Triple Bottom Line
ABS	Australian Bureau of Statistics
ACLG	Australian Council of Local Government
ACT	Australian Capital Territory
AMC	Australian Maritime College
AMOS	Analysis of Moment Structures (Add-on module for SPSS)
ARP	Australian Regional Port
ASIC	Australian Securities and Investment Commission
BITRE	Bureau of Infrastructure Transport and Regional Economics
BTE	Bureau of Transport Economics
BTRE	Bureau of Transport and Regional Economics
C	Code
CAGR	Compound Annual Growth Rate
CDEP	Community Development Employment Projects
CEO	Chief Executive Officer
CFA	Confirmatory Factor Analysis
COAG	Council of Australian Government
CR	Composite Reliability
CSR	Corporate Social Responsibility
CT	Composite Theme
DPC	Darwin Port Corporation
DSE	Department of Sustainability and Environment
DU	Dhaka University, Bangladesh
EFA	Exploratory Factor Analysis
Ex-MMQ	Explicit Mixed methods Research Question
FL	Factor Loading
FNQPC	Far North Queensland Ports Corporation Limited
FTE	Full Time Equivalent
FTZ	Free Trade Zone

GDP	Gross Domestic Product
GM	General Manager
GOC	Government-Owned Company
GT	General Theme
HEI	Higher Education Institute
HM	Harbour Manager
HREC	Human Research Ethics Committee
IAME	International Association of Martime Economists
ICD	Inland Container Depot
ISO	International Organization for Standardization
L&RED	Local and Regional Development
LNG	Liquefied Natural Gas
MP	Metropolitan Ports
MIDA	Maritime Industrial Development Area
MLM	Maritime and Logistics Management
MM	Mixed Methods
MT	Major Theme
MUA	Maritime Union of Australia
NGO	Non-Government Organisation
NPS	National Ports Strategy
NQBP	North Queensland Bulk Ports Corporation Limited
NS	National Statement
NSW	New South Wales
NT	Northern Territory
NTC	National Transport Commission
OECD	Organisation for Economic Co-operation and Development
PO	Port Officials
PS	(External or Other) Port Stakeholders
QLD	Queensland
R&D	Research and Development
RD	Regional Development
RDA	Regional Development Agency

REES	Regional Export Extension Service
RIS	Regional Innovation System
RP	Regional Port
RQ	Research Question
RW	Regression Weight
SA	South Australia
SPA	Shipping and Pilotage Act 1967
SPSS	Statistical Package for the Social Sciences
SS	Social Sciences
SSOC	Statutory State-Owned Corporation
SUA	Significant Urban Areas
TAS	Tasmania
TasPorts	Tasmanian Ports Corporation Pty Ltd.
TEU	Twenty Equivalent Unit
TIP	Telephone Interview Participant
UK	United Kingdom
ULC	Urban Centres and Localities
UNCTAD	United Nations Conference on Trade and Development
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
US	United States
UTAS	University of Tasmania
VIC	Victoria
VPSF	Victorian Ports Strategic Framework
VRCA	Victorian Regional Channels Authority
WA	Western Australia
WMU	World Maritime University, Sweden

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1: INTRODUCTION

1.1 Research Background

The role of a port has changed considerably over time. Throughout the history of mankind, many civilisations established themselves on the banks of a river. People used the river as an approach to sea for their livelihood, and it later became a place of maritime transport activity (port). The concept of a 'generation of ports' in the evolution of port study (UNCTAD 1992a, 1999) explains the roles of ports in the second half of the twentieth century. This concept defines the traditional roles of a port from transferring, storing and delivering goods (1st generation), to industrial and commercial activities as a service centre (2nd generation), to maintaining hinterland links and logistic platforms for trade (3rd generation), to networking among ports through common operators or administration (4th generation) (Paixao & Marlow 2003; Verhoeven 2010).

Ports have been seen from various perspectives throughout the evolution process. Some noteworthy port concepts and descriptions are as follows:

1) A seaport is a gateway through which goods and passengers are transferred between ships and the shore (Goss 1990c). It is a place where ships load or discharge their cargoes. It is also a business organisation, having interests in commercial activities and responsibilities for public interests.
2) A port is no longer simply a place for cargo exchange, but a functional element in the dynamic logistics chain through which commodities and goods flow (Cahoon 2004; Goss 1990c).
3) A port is a link in the logistics chain (Almotairi 2012; Mangan & Cunningham 2000).
4) A port is a value enabler in the value chain (Robinson 2002). It is a vital part of the supply chain and as well as a natural focus for regional development and employment initiatives (Bryan et al. 2006).

In the above descriptions, the relationship between a port and its host region is focused indirectly.

1.1.1 Ports and regions

A port-region is the primary port area, including its adjacent municipalities and links with transport and suppliers. It should support opportunities for port expansion in a multi-dimensional network (De Langen 2008). A port and its relationship with the region in which it is embedded (that is, host region) and the hinterland it serves is inseparable from a spatial economic standpoint. The region surrounding a port can be considered as a nodal region. Haggett (1972) describes a nodal region as a settlement that can be a farm, village, town, or city and the surrounding area which is in a system of easily identifiable functional units connected to a focal point by routes of communication. A port can be regarded as a focal point, as it is usually connected with other functional units in its host region. One important task of a port is to increase the value of local resources by exporting them to other locations, or in other words, influencing geographical specialisation of its host region (Rodrigue 2003). A port can also facilitate the integration of socio-economic activities and the establishment of effective transportation routes across different regions (Rodrigue, Comtois & Slack 2009). Hence, a port is capable of facilitating a competitive advantage for regional products.

Regional development can improve the socio-economic position of a region by supporting employment and generating wealth through economic activities (OECD 2011a). The existing literature on ‘regional development’ emphasises the interaction of four essential elements: natural and created resource endowment, potential human and resource mobilisation, command and control of resources, and recognition that resources are created, conserved and reproduced (Dunford 1990), in other words, the promotion of innovation. Regional development policy focuses on the overall improvement of the standard of living and

immediate needs of a region, whereas regional innovation policy focuses on competitive advantages and providing a systemic approach for sustainable growth within a region. In order to create competitive advantages for regional development, dynamic leadership is crucial. Leadership capability in a network situation requires the ability to effectively manage processes and resources to create successful outcomes, in other words the ability to integrate, generate and reconfigure internal and external resources (Harmaakorpi 2006). Harmaakorpi (2006) also emphasises innovations and organisational aspects of clusters and networks for generating a regional competitive advantage.

A port, as a transportation infrastructure, is a crucial resource and has the potential to contribute in each of the above mentioned elements of regional development. The contribution of a port to economic development is well recognised, due to its ability to facilitate trade and transport, generate employment and attract investment (Bryan et al. 2006; Mangan & Cunningham 2000; UNESCAP 2005). In this competitive global market, import and export are crucial in maintaining a complementary relationship for regional growth. The services of a regional port link industries, products and markets, that is, supply and demand, which ultimately promotes regional products and innovation (Chen et al. 2010). This illustrates that ports are significant in gaining competitive advantages and thus contributing to regional development (Hoyle 1983 in Cahoon 2004) .

However, research into the mutual benefits and interdependence of ports and their regions remains largely unexplored due to the lack of useful data (Bird 1971; Ducruet 2009). The question about whether the port infrastructure is required for regional development, or vice versa, has been raised by some researchers (Ducruet 2009; Rietveld 1989). Nevertheless, the roles of ports and their impact on regional wellbeing have also been explored (Haddad, Hewings & Santos 2005). In relation to understanding and boosting regional development in a port-region, aspects of

agglomeration economics, cluster theory, spatial economics and regional innovation models can provide significant insights (De Langen 2004b; Harmaakorpi 2006). A port's business fosters geographical concentration, which is one of the main characteristics of agglomeration economics (Marshall 1890 and Asheim 1994 mentioned in De Langen 2004) and cluster theory (Porter 1990; Ron & Sunley 1996).

The research into ports and regional development can facilitate a better understanding of the strategic issues relating to regional development. From this perspective, the socio-economic sustainability and growth of a port and its relationship to regional development can be an effective and pragmatic issue to pursue. Port research relating to the relationship between ports and regions can be grouped into three branches:

1) The morphological approach, in which the relationship between structure and activity, for example, city-port relationship, chronology and distinct development phases of a port, and the concept of port life-cycle are prominent (Morgan 1952, Bird 1963, Slack & Wang 2003, Robinson 1985, Hoyle 1989, and Charlier 1992 mentioned in Olivier & Slack 2006).

2) The topological approach, in which the concept of a port as structural node, and a port's ability to contribute to regional or national development are prominent (Chorley and Haggett 1970, Kansky 1963, Alonso 1964, Hoyle and Pinder 1981, Taaffe et al. 1963, Rimmer 1967, Hoyle 1968 and Hayuth 1981 mentioned Olivier & Slack 2006).

3) The taxonomical approach, where organising, grouping and clustering of port systems in a spatial context and the inter-relationships are studied. In this latter type of approach, the focus is on the port users' perceptions, the decision making processes behind port selection by

the port users, their relationship with the port, and the port's ability to channel trade flow (Olivier & Slack 2006).

In the existing research into ports and regional development, ports have been described as engines or growth poles of local and regional development (Haralambides 1997; Rietveld 1989). However some researchers see ports as merely satisfying demand by providing freight transportation (Damesick 1986; Fujita & Mori 1996; Goss 1990c; Grobar 2008; McCalla 1999; Rietveld 1989; Rodrigue 2003). They point out the negative aspects of port business, such as congestion, unattractiveness of environment, and the reduction of employment opportunities due to the introduction of new technology, a shift in logistics, changes in terminal operations, hinterland transport system, port traffic system, and the relocation of port-oriented services. Nevertheless, some researchers (Notteboom, Ducruet & De Langen 2009) regard port development and regional growth as two different progressions which are indirectly and intermittently linked.

According to Robinson (2002), a port is a value enabler and an element in the value chain. A port can also be an enabler of economic development (Ducruet 2009). Value chains spread and run through geographical regions and ports act as important nodes in this network. These two general perceptions illustrate that ports can contribute greatly to regional development.

1.1.2 Australian regional ports

The unit of analysis of this study is the Australian regional port (ARP). In general, the term 'region' may mean: a group of nations (international context) or a group of sub-national areas (national context). The region is also central to regional development research because of the disparity between regions in achieving fundamental socio-economic and environmental attributes. These may include employment opportunities,

income levels, health and education services, and standard of living (Beer, Maude & Pritchard 2003). In Australia, a region includes non-metropolitan and rural areas and the discussion on regional issues is very much influenced by and debated in the political landscape (Beer, Maude & Pritchard 2003). In terms of regional ports, various classifications can be found in the literature but with no unified definition. For example, Vleugels (1969) describes small ports as being 'regional ports' that only handle cargo imported into or exported from their respective port-regions, while Bichou (2009) classifies regional ports from a hinterland or spatial market perspective. In this study, the term 'region' or 'regional' relates to the national context and the term 'regional port' is defined as a port which is located outside metropolitan cities and which serves regional businesses.

The distribution and location of 70 Australian ports follow the geographic outline of Australia and illustrate the significance of ports as connectors between sea and land transportation for international and regional trade. Of these 70 ports, 65 regional ports perform approximately 85% of the total national cargo handling task (Anderson 2011; Ports Australia 2013b). The remaining five are metropolitan ports located in Sydney, Brisbane, Adelaide, Melbourne, and Fremantle (Perth). These five ports are mostly engaged in container cargo handling and are known as capital city ports. The Australian national ports strategy (NPS) identifies four areas of action, including port planning and infrastructure, protecting ports' ability to execute plans, improving landside efficiency and reliability, and ensuring clarity, transparency and responsibility in ports (Infrastructure Australia 2010c). The NPS signifies the necessity for innovative strategic initiatives for Australian regional ports for effective implementation of these activities. It also highlights the need to increase the capacity of these ports to contribute to regional development.

Although regional ports in Australia have great potential, the growth and sustainability strategies of these ports still require attention. Opportunity

capturing can be a strategy to ensure further growth for such ports (Magala 2004). But the word ‘opportunity’ itself relies on a certain degree of uncertainty. It is strategically better to aim for innovation and play to the strengths and capabilities of a port for further growth and economic sustainability. In other words, a port has to play a strategic role to ensure firm ground for its own future through regional development; this can also be a way of seizing opportunity.

The types of business undertaken by Australian regional ports are manifold. Some ports are dependent on only one or two commodities. For example, many Western Australian ports are dependent on the mining industry (Government of Western Australia 2011b, 2012). Boosting underutilised coastal shipping (MUA 2008) through these regional ports and connecting them with transport corridors on the land side is yet to be developed. The viability and sustainability of these regional ports are very much dependent on innovative strategies, proactive measures and contributions to regional development (Sakalayen, Chen & Cahoon 2013). The image problem of the port industry all over the world is a long existing issue as it is in Australia (Chang 2013; Fleming 1987; Homsombat et al. 2013; Szili & Rofe 2007), but it is also important that these ports are contributing to their regional development. If the contribution of regional ports to regional development can be enhanced through adopting proper strategies and implementing them, it will not only maintain a port’s economic sustainability but also improve the image of the port industry. For example, the enhancement of corporate social responsibility of ports may be supportive in this regard (Fransen 2013)

The role of Australian regional ports in regional development and the overall national economy is immense (Infrastructure Australia 2010c; Newlyn 2009). It has been shown that Australian regional port related activities have a significant impact on regional economy through increased output, value adding, household income and employment (BTE 2000,

2001a, 2001b; EconSearch 2009). However, the evidence is centred on the economic impact of regional ports. Australian regional ports face many challenges, such as the availability of land for infrastructure development, sourcing investment funding, strategic planning, community involvement and port performance measurement, etc. (Infrastructure Australia 2010c; Webb 2010). The most metropolitan ports in Australia are heavily congested (Infrastructure Partnerships Australia 2009b). The rapid growth of metropolitan ports means that expansion is needed which requires further land use or innovative strategic approaches. The geography of Australia and the location of port facilities suggest that the development of a network of sea routes joining these ports would be valuable. These strategic approaches could be developed in collaboration with regional ports, and this would enhance the potential of regional ports in Australia.

Australian regional and metropolitan ports can be complementary to each other in terms of function and activity. Geographical proximity is an important factor in this regard, as proximity inspires innovation and learning (Boschma 2005). Harmaakorpi (2006, p.1093) asserts that 'learning and knowledge are the driving forces of innovations leading to the competitive advantage of regions'. In this respect, it is necessary to examine the roles of Australian regional ports to establish whether they can play a strategic role in facilitating regional development.

As a centre for transport activities, a port is a crucial 'node' in the supply chain, further serving as a logistic hub where hinterland development, innovation, community involvement and socio-economic impacts are essential strategic issues. However ports' contributions to regional development, particularly from a spatial and socio-economic point of view, are less apparent. These unrecognised inherent characteristics drive ports to make arbitrary planning decisions for the region which should be strategically planned and governed. In order to explore the pattern of this

contribution to regional development, regional ports in Australia have been selected for this research.

1.2 The motivation for this study

This section addresses the research problems and gaps in the existing literature on regional ports, which motivated the researcher to conduct this study.

The relationship between ports and their host regions is gaining increasing attention from maritime logistics experts (McLaughlin & Fearon 2013). However, the existing literature mainly centres on metropolitan ports or major container ports, and pays little attention to regional ports in a national context. Regional development has a number of dimensions (Nermend 2009) which can be defined as social, economic, environmental and spatial dimensions. Undertaking research related to the port-region relationship can be enriched by considering these regional development dimensions. Nevertheless, existing port research focuses on evaluating ports' impact on regional economic development by measuring the consuming multiplier effects of regional ports. The literature also indicates that the geo-dimensional role of ports is emerging (Verhoeven 2010), which requires further investigation to understand its dynamics. In this context, the contribution of regional ports to other dimensions of regional development, in other words, the overall strategic approach of ports to their host regions needs to be explored. This has motivated the researcher to undertake a multi-disciplinary research from a strategic standpoint involving regional ports and regional development.

International port studies relating to the port-region relationship are mainly centred on container hub ports, and this is the same in Australia. As indicated in section 1.1.2, a great number of regional ports (65) relative to metropolitan ports (5) spread along the borderline of Australia and covering the regional and rural areas as hinterlands, the Australian

regional ports have immense strategic potential for regional development. Despite the symbiotic relationship between regional ports and their host regions, this area has not been widely researched. The National Ports Strategy of Australia recognises the significance of ports in terms of port planning and infrastructure, ports' ability to execute plans, improving landside efficiency and reliability, and ensuring clarity, transparency and responsibility (Infrastructure Australia 2010c). However, it has not identified regional ports as a separate category, considering their diverse geographical settings and relative position to metropolitan ports (Infrastructure Partnerships Australia 2009b). This absence also motivates the researcher for undertaking this pioneer study to explore innovative strategic initiatives for Australian regional ports within their host regions for their effective involvement in regional development.

1.3 Research questions and research objectives

The purpose of this research is to explore strategies for effective contributions by Australian regional ports to regional development. A mixed methods research methodology has been adopted for this study. Accordingly, the following research questions have been posed.

Research question:

RQ 1: How are Australian regional ports currently involved in their host regions?

RQ 2: What is the scope for Australian regional ports to be involved in regional development?

RQ 3: What are the factors pertinent to Australian regional ports' involvement in regional development?

RQ 4: What strategic initiatives can be undertaken by Australian regional ports to be better involved in regional development?

The explicit mixed-methods research question:

How can Australian regional ports effectively contribute to regional development?

On the basis of the research questions this study aims to achieve the following objectives:

1) To examine the relationship between a port and its region
2) To explore the regional development dimensions and approaches relevant to ports
3) To explore whether a regional port could be a driver for regional development
4) To examine current strengths, constraints and opportunities of Australian regional ports which influence regional development
5) To investigate how Australian regional ports currently contribute to their regions
6) To identify important factors for Australian regional ports' involvement in regional development
7) To empirically explore strategies which Australian regional ports can adopt for effective contribution to regional development

1.4 Research methodology

This research is central equally to port business strategy and academic works related to both port and regional development. The objectives of the research are to explore the role of a regional port in regional development and to propose pertinent factors and corresponding strategic initiatives for Australian regional ports for effective contribution to regional development. To achieve these research objectives, this study adopts explorative approaches to maximise the expected research outcomes. An exploratory sequential mixed methods research methodology has been employed (Creswell & Plano Clark 2011), not only to analyse and explore but also to deepen and widen the understanding (Olsen 2005) of a regional port's contribution to regional development.

Figure 1.1 shows the research plan of this study. The exploratory sequential mixed methods research design consists of a qualitative study (first phase) and a quantitative study (second phase).

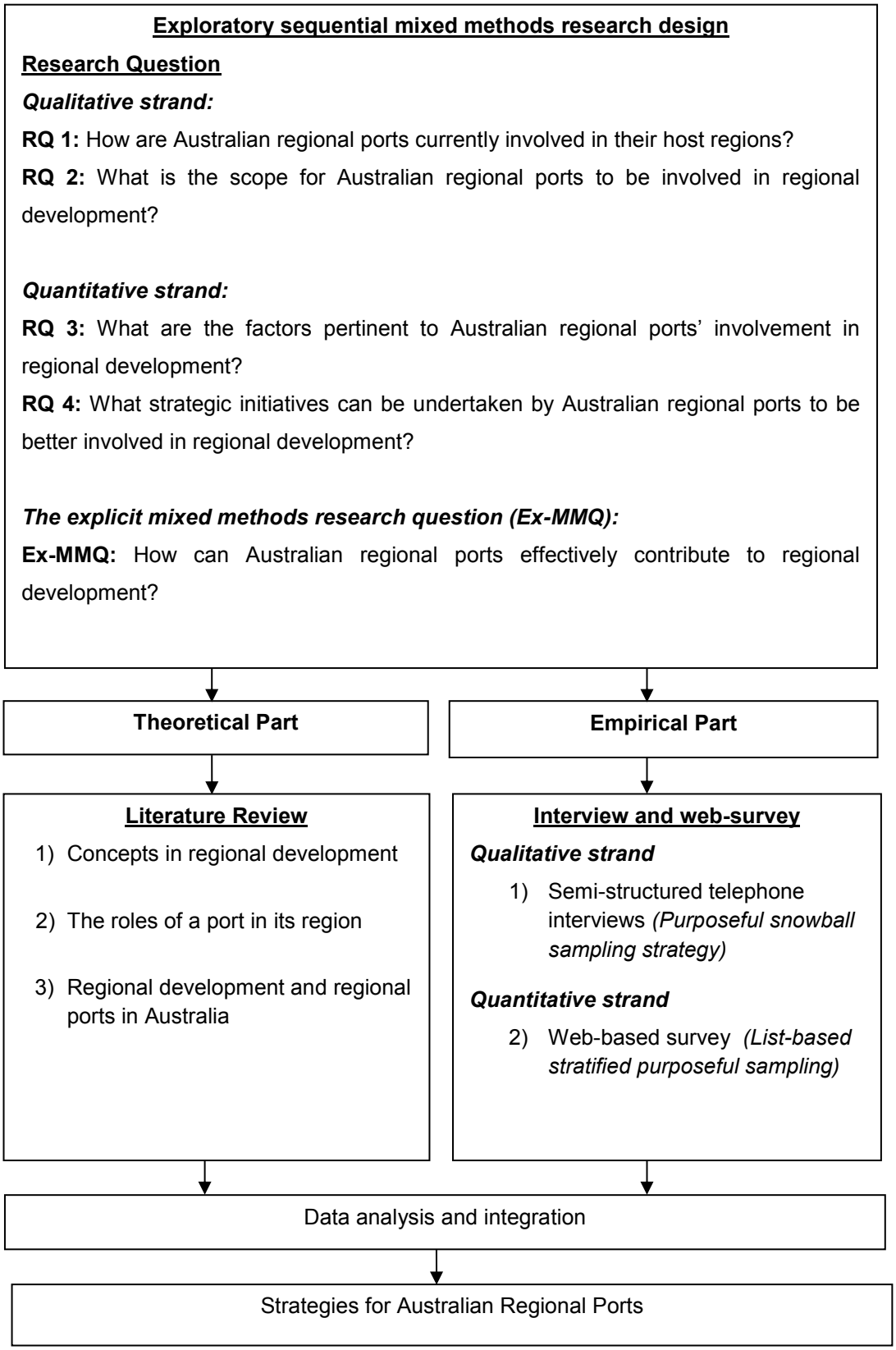


Figure 1.1: The research plan

Australian regional ports have been chosen as the unit of analysis. For data collection, Australian regional port stakeholders consisting of internal port stakeholders (port officials) and external port stakeholders (port policy and planning contributors and port users) are covered in this research. Following an extensive literature review on regional development, roles of ports in regional development and Australian regional ports from secondary data, this research conducts an empirical study collecting the primary data through semi-structured interviews (qualitative approach) and a web-based survey (quantitative approach).

Semi-structured telephone interviews with the key Australian regional port stakeholders in the qualitative strand aim to understand the current involvement of Australian regional ports in their host regions and to evaluate the scope for ports' involvement in regional development.

The interviews explore the perceptions of key port stakeholders in relation to regional ports' contributions to regional development. The web-based survey in the quantitative strand focuses on the pertinent factors and corresponding strategic initiatives for enhancing the involvement of regional ports in regional development. Data integration forms the basis of the inference drawing process.

1.5 Structure of the thesis

The thesis contains eight chapters. The first chapter is an introductory chapter which states the background, motivation, research questions, objectives and approaches of the study. The remaining chapters are outlined as follows:

Chapter Two reviews the general perspective, dimensions and factors of regional development as well as the approaches for regional development.

Chapter Three reviews the literature on the role of a port in its region. It covers port-region relationship, port evolution, port function, management and governance, roles of ports and port authorities, and port strategy for regional development.

Chapter Four focuses on regional development in Australia and Australian regional ports and interrelated issues.

Chapter Five details research design and methodology for this exploratory sequential mixed methods research. This involves explaining the appropriate data collection methods in both qualitative and quantitative strands suitable for undertaking interviews and surveys on Australian regional ports. The unit of analysis, target population, sampling strategy, survey instruments and administration processes, data collection, editing, coding and data analysing methods are also discussed in this Chapter.

Chapter Six details the analysis of data collected through in-depth semi-structured telephone interviews in the qualitative strand (first phase). The chapter conceptualises Australian regional ports' strategic involvement in regional development based on the interviews with key Australian regional port stakeholders.

Chapter Seven presents an analysis of the web-based survey data in the quantitative strand (second phase) and investigates the strategic role of Australian regional ports in regional development. The exploratory factor analysis (EFA) followed by a confirmatory factor analysis (CFA) are employed to find the pertinent factors and corresponding strategies for Australian regional ports to effectively contribute to regional development.

Chapter Eight is the concluding chapter, presenting a summary of findings from the literature review and the empirical study, and the implications and

contribution of the research. The chapter concludes with the limitations and future research directions.

CHAPTER 2: CONCEPTS IN REGIONAL DEVELOPMENT

2.1 Introduction

The previous chapter introduced the motivation and plan of the research. The aim of this chapter is to increase understanding of regional development concepts from an organisational standpoint. Regional development occupies an important place in any national government agenda and in the international forum. It is a fundamental vehicle to support and improve the livelihood and standard of living of people all over the world. In a national context, the suitable demarcation of geographical regions, patterns of regional governance, types of regional institution, infrastructure and businesses can be regarded as integral to regional development. The infrastructure of a region provides services, generates economic vitality and attracts investment opportunities. The presence of infrastructure such as ports and their efficient and strategic utilisation can make a crucial difference for regional development. In this chapter the general perspective, dimensions and factors will be reviewed, as well as the approaches for regional development.

2.2 Defining a region

The term ‘regions’ is used by various entities and encompasses a wide range of phenomena (Schmitt-Egner 2002). Regions are the result of purposeful imposition of spatial orders on surroundings and are mainly social constructs driven by economic, social, and political processes (Beer, Maude & Pritchard 2003). The concept of ‘region’ originated from the Latin ‘regio’, which refers to describing a spatial area (Nermend 2009), and is at the core of the regional development discussion. Regions have different forms defined by their territorial scale and composition where utilisation and accommodation of diversified opportunities are the key elements for regional development (Henderson 2010). From a functional perspective, a

region is regarded as an action unit in the context of political science and as an action space in the geographical context (Schmitt-Egner 2002). Regions are spaces created in political, economic, cultural and administrative practices and discourses where social actions take place (Passi 2001 in Thomas, Harvey & Hawkins 2012). Therefore, a region encompasses both characteristics- it is an action unit where actions take place in a concomitant matrix.

Generally, the term ‘region’ may be defined in two different ways, either as a group of nations (supra-national), or as a small sub-national area. However, commonality remains as a dominant feature for defining a region (Eversole & Martin 2005). In that a region may be classified as ‘a group of adjoining areas or places that have something in common’ (Stilwell 1992, p.45). They can be of various scales and types, and influenced by political settings (Beer, Maude & Pritchard 2003). The political salience of regions may also include demographic variations, attitudes and behaviours of people (Henderson 2010), functional diversity, priorities, and aspirations of societies (Mueller 2014). A region is ‘an important unit for organising development strategies and processes’ (Eversole & Martin 2005, p.3).

Cooke, Uranga and Etxebarria (1998) illustrate that regions evolve through two processes. The first process is by regionalisation, where organisations are entrusted with the administrative powers to interact and stimulate the prevailing institutional conventions, even introducing new rules and thereby giving less priority to already existed regional cohesiveness and regional identity. The second process is by regionalism, where the awareness of regional organisations about existing strong social capital (networking, shared values and trust in the region) and political demand, help them give active expression to regional institutions for the regional innovation system.

In an international context, a region can be defined several ways, such as a cluster of countries in the same geographic area. However this notion has become less prevalent, due to the ripple of globalisation and liberalisation. The geographic context in defining a region's criterion has become less important compared to other relevant elements, such as common economic interests and cultural interests. The concept of a region as a group of countries that have strong trade links has emerged because of globalisation. A region can be an area where development and market orientation are of a similar level (UNCTAD 1996), or is a recognisable, large area which has an impact in competitive globalised economies (Braun 2005).

In a national context, a region may be characterised as areas with similarities in living conditions, public facilities and growth. A common identity is at the core of defining a region. A regional identity creates an environment that acts like a brand. Regions need to be able to construct an identity that will encourage growth, as well as attract and retain investment and highly qualified workers, that is, to become 'sticky places in slippery space' (Marcusen 1996 in Hudson 2005, p.314). A regional identity makes people conscious of their region and enhances public participation in planning for the region. It is usually influenced by elements such as the name of the region, dialects, territorial boundaries, landmarks, infrastructure, organisations and established practices, institutional thickness, consciousness about the society, history and people's spiritual space (Raagmaa 2002).

2.3 Regional development

Regional development can be defined as an attempt to progress the livelihood and socio-economic situation of a region by supporting employment and generating wealth through economic activities, enhancing innovation and sustainability and re-evaluating resources (Moulaert & Mehmood 2010; OECD 2011a). Regional development is a

broad concept describing the efforts of regional communities to enhance economic, social, cultural and environmental standards by employing regional resources including human capital (Nermend 2009). Regional growth only considers economic factors (Coombs 2001) that can be measured as a gross regional product per capita growth (Nermend 2009), therefore regional growth is a sub-set of regional development, which focuses on the economic aspect.

Martinez-Vazquez and Vaillancourt (2008) view regional economic development as the efforts, supported by voters, politicians, communities and businesses, to enhance employment, income, wealth and opportunities within a defined geographic area. Consensus among the individuals, communities and businesses of a region for serving a common purpose and creating a reason for co-operating is crucial for regional development where a leadership role is essential (Beer, Maude & Pritchard 2003). The purpose of regional development is to achieve competitive advantage and sustainability for the region and its economy, where stakeholders' active participation and engagement is critical (Eversole & Martin 2005).

Regional development usually has two perspectives. The international perspective is where various inter-governmental organisations, regional development banks, aid agencies and non-government organisations (NGOs) work to improve the region. The national perspective is where each nation tries to improve the regions in its jurisdiction through various public, private, and commercial agencies and NGOs. Both perspectives have the common goal of improving the socio-economic condition and livelihood in the region. In this research, the terms 'region' and 'regional development' relate to the national context.

In both perspectives, creating enabling environment for regional development is critical where social capital and resource endowment and

configuration provide synergistic thrust. Nischalke and Schollmann (2005) refer to intangible resources, such as rules, norms, routines and practices of the region or untraded interdependencies which create links enabling environment for regional development. Cooke, Uranga and Etxebarria (1998) classify these links as ‘soft institutions’ in contrast to ‘hard institutions’, which are the organisations in regional development. In consistent with the pioneering conceptualisation of North (1990), they liken ‘institutions’ to the rules of the game and ‘organisations’ as actors or teams that are involved in, or play the game. The trust, values and culture as well as the way people and organisations communicate, link and relate to each other within a region, form the social factor for regional development, referred to as ‘social capital’ by many academics. According to Beer, Maude and Pritchard (2003), social capital is crucial for regional development which includes soft institutions, social norms, values, trusts, habits and conventions. It influences the ways of interaction between and among people and organisations in a region, enabling communities in the region to fix common problems in cooperation.

From a practical perspective, resource endowment and resource configuration are significant elements for regional development (Harmaakorpi 2006). The success of regional development does not only depend on economic growth but also on social, environmental and cultural achievements (Nermend 2009). Resource endowment, configuration, scarcity and depletion, as well as disparities in socio-economic progress and disproportionate growth are interconnected elements of regional development. They assist in integrating social, environmental and cultural achievements with the economic growth of a region and promote sustainable development (Benneworth, Conroy & Roberts 2002; Harmaakorpi 2006). The appropriate policy remains as a key for regional development.

2.3.1 Regional development and policy

A regional policy is a set of strategies and guidelines from government levels, usually reactive in nature, and is generated on a post-hoc basis in response to certain issues or setbacks (Collits 2004). By contrast, a regional development policy encompasses the overall regional governance and development policy, is decentralised in nature, sensitive to diversity and the adaptability of the region concerned, and is developed through regional stakeholders (Hudson 2005).

Globally, regional policy is gradually transforming into regional development policy, where regions cannot only be a passive recipient of the central government's aid, but the architect of their own future, through taking decisions for resource configurations and curbing their requirements (Hudson 2005). Generally, the objective of a regional development policy is an increase in competitiveness (Moulaert & Mehmood 2010). Among several approaches to regional development policy, the Keynesian approach to regional policy advocates government policy intervention, such as income redistribution, welfare and incentives as a means to stimulate demand in the less favoured regions (Amin 1998; Lee 2012; Seidman 2012). By contrast, the neo-liberal approach favours deregulation and market mechanisms to stimulate small-firm entrepreneurship (Müller 2008). An institutionalist approach encourages endogenous potential, unlocking regional wealth, and collective socio-economic behaviour (Brette & Moriset 2009; Rodríguez-Pose 2013)

Moulaert and Mehmood (2010) focus on the new regionalism, strategic coupling and relational geography approaches. New regionalism, a dominant approach, supports the role of institutional dynamics and path dependency in regional development analysis and favours the popular learning region concept. The strategic coupling approach goes beyond new regionalism and endorses coupling between production networks and regional assets and inspires value creation, enhancement and capture.

The relational geography approach views regional development as a function of synergised relational assets and focuses on relational scales, social embeddedness and relational embeddedness in networks.

Liou (2000a) identifies two approaches for regional development policies and programs such as supply-side approach and demand-side approach. The supply-side approach proceeds with stimulation for location incentives, which encompasses special tax incentives, labour incentives, debt financing, tax-increment financing arrangements, infrastructure investment, regulatory policy, enterprise zones, and site development. The demand-side approach concentrates on local market demand factors and mainly includes business incubators, small business support, research and development support, venture capital financing and employment generation strategies.

On the whole, neo-liberal government policy encourages competition, supports deregulation and privatisation, limits market intervention of government and offers narrow avenue from government to support regional development (Maude 2004).

2.3.2 Regional governance

Regional governance is referred to as a set of working relationships among various level of government, community, private sector and people of a region to achieve certain objectives (Beer & Maude 2005). It creates the environment for regional development. Generally, regional governance can be described as an association of governments and people to control and regulate the behaviour of the service providers, stakeholders and businesses in the region, in order to attain an environment which exceeds more than cooperation (Norris 2001).

Regional governance provides the frameworks of process, structure, and relationship at a regional level, involving public organisations, interest groups, and citizens for making decisions and for exercising and sharing

powers with the regional community (Bellamy & Brown 2009; Eversole & Martin 2005). A system of regional governance and regional policy can be helpful for regional development, as it may fix goals and create synergy in the region. These are important to streamline behaviour of regional stakeholders and stimulate interest groups and stakeholders intuitively responsible for regional development tasks (Benneworth, Conroy & Roberts 2002; Collits 2002). The extent and pattern of the government's role in regional governance may vary from country to country.

In the regionalisation approach, a top-down evolutionary process of the region, the central government plays a major role in regional governance, while organisations, interest groups, and stakeholders at regional level have supporting governance activities (Cooke, Gomez Uranga & Etxebarria 1997). In regionalism, the bottom-up evolutionary process of the region, the central government creates a congenial atmosphere and plays a partnership role, where the synergy among the organisations, interest groups and stakeholders generate an intuitive regional governance situation (Cooke, Uranga & Etxebarria 1998; Norris 2001).
Gaffikin and Morrissey (2001) argue that regional development is not the task of government alone, rather a concerted effort of the entire community, including statutory agencies, politicians and the private sector at regional level. The effective partnership among these entities is the key to regional governance, where the public sector can be the enabler, broker and entrepreneur, rather than a provider. It is possible that regional matters may have an impact on national and international policies and forces in the present global context, and may demand more state and central government support (Maude 2004).

Hudson (2005) asserts there is no alternative to the significant role of the State for regional governance, which can promote gradual self-reliant status of regions. In contrast to this, Benneworth, Conroy and Roberts (2002) argue that enhanced regional liberty and command may inspire the

regions to go for growth-driven approaches to development, rather than sustainable regional development. It is also possible that the variation of planning and strategic capabilities and interests of different quarters of regional association can also signify the extent of government's interference in regional governance. Government should always have a role in regional development, not as an interventionist, but rather as an enthusiastic partner (Liou 2000b). A partner-based leadership approach needs to be developed among different levels of government and regional communities, as both have their interests, capabilities and deficiencies to act for the regions. A region with any level of social capital may need a cross-checking point to get an appropriate pathway for regional development, where government's role will be pivotal in regional governance and a comprehensive regional policy can guide the overall process.

2.3.3 Regional development agency

Regional development agencies (RDAs) are semi-autonomous business-led organisations, functioning at the regional level with expertise on regional issues for facilitating regional development (Shaw & Lloyd 2000). The RDAs are also known as regional development organisations which are created to integrate, support and coordinate regional development activities. The semi-autonomous nature of RDAs allows them to coordinate between private and public stakeholders in the region (Young-Hyman 2008). They may even work in the absence of training and research institutions and where there is a lack of local suppliers in a region (Beer, Maude & Pritchard 2003).

Benneworth, Conroy and Roberts (2002) suggest that an RDA's function is not limited to increasing regional economic development but to also uphold and support sustainable development. They facilitate regional governance structures for improving the regional economic scenario, cultural values and living standards, and ensuring a bottom-up partnership

between the State and regional stakeholders (Syrett & Silva 2001). The requirements and circumstance of regions become vital in developing RDAs. In addition to RDAs, regionally-based businesses, infrastructure and organisations also have roles to play in regional development through which a collective sense of purpose in the region is ensured (Shaw & Lloyd 2000).

Various requirements may change the style of operation and roles of RDAs, which may include contributing to policies and development of strategy (Shaw & Lloyd 2000). In Europe, the fundamental objective of RDAs is to uphold the region's economic development potential (Young-Hyman 2008). RDAs strategically function in wide partnerships involving regional players and signifying concern for the holistic development of a region (Shaw & Lloyd 2000).

RDAs rooted strongly in the region can promote partnership by providing information, attracting external investment, supporting infrastructure for development, promoting products and resources, negotiating plans and programmes, arranging events and debts concerning the region and participating in consultative bodies (Syrett & Silva 2001). However, the profusion of agencies for regional development activities at local, regional and national level can be a problem and competition amongst these agencies may cause confusion, a duplication of services and a waste of valuable resources (Shaw & Lloyd 2000).

The competition for funding for regional development exists among regions and regional development agencies (Camagni & Capello 2010; Chalmers & Weiler 2011; Malecki 2004). This raises discussion in the political arena about the short-term distributional effects of funds and fiscal management as the gain of one region can be regarded as loss for another (Blöchliger & Vammalle 2012; Grolleau, Galochkin & Sutan 2012). In other words, the economic and technological expansion of one region

occurs at the expense of other regions (Hornborg 2009). This notion is referred to as a zero-sum game model of development as opposed to the 'cornucopia' model where the growth of one area is viewed as beneficial for other peripheral areas (Hornborg 2009). The government distributes the scarce resources for regional development according to the competitiveness and investability of the regions (Begg 2002). At the same time, government's assistance for sub-regional development may result in a competitive scenario with no stable impact. For example, in the European context the inconsistency and instability of structural funds distribution to sub-national regions lead to potential conflicts between strategy and lack of impact for the funding (Ascani, Crescenzi & Iammarino 2012; Crespy, Heraud & Perry 2007; Dotti 2012; Fleurke & Willemse 2006; Kettunen & Kungla 2005). A balanced public-private partnership may be helpful in reducing the risk of inconsistent funding impact and achieving a stable development environment for sub-national regions.

In addition to the politico-distributional situation, the zero-sum game notion has also been argued for trade competitiveness (Budd & Hirmis 2004; Prestowitz 1994). But trade is usually only a small part of the gross national product for most countries and has relatively less deterministic influence on living standards (Prestowitz 1994). The main problem of the zero-sum notion is in defining progress in terms of economic growth and technological advances (Norgaard 1994 mentioned in Hornborg 2009). Resource distribution and fiscal policy is central to regional development (Blöchliger & Vammalle 2012), which is about wealth creation and elevation of the living standard for all (Radcliff 2012; Tsheola 2002); it involves various dimensions of development in a blended social, economic, environmental, and spatial matrix in a region. Regional development is closely related to the ever changing competitive dynamics of global production networks (Yeung 2009). Economic growth and technological advancement are crucial for improving the living standards in

a region. Therefore, regional development is often a zero-sum game from the perspective of a government's fund distribution strategy and consequently from an economic and technological advancement point of view, but not in the broader context of development.

2.4 Dimensions and factors for regional development

Identifying factors and dimensions for regional development is a complex task because of their interweaving nature and the various contexts of regional development. The factors for regional development may also vary considerably from region to region. The comprehensive work of Nermend (2009) presents assessments of the various authors on regional development factors in several contexts or dimensions. Table 2.1 summaries different classifications of regional development factors, based on Nermend's (2009) comprehensive work. These dimensions include regional development determinants (Kudelko 2004), transformation in regional space (Strahl 2002), strategic planning (Markowski 2002), socio-economic activity (Bagadzinski 1994), functional assets (Markowski 2002) and sustainable development (Stimson et al. 2006). [Authors are mentioned in Nermend (2009)].

The dimensions such as regional development determinants and transformation in regional space are similar in nature as it is reflected from the factors they include (see Table 2.1). The strategic planning dimension describes regional development as the outcome of socio-economic development in a region characterised by sustained improvement in competitiveness and people's standard of living, which is also similar to socio-economic activity dimension. The sustainable development dimension is characterised as the development of the present situation without risking the needs of the future (Nermend 2009). The intended sustainable development of a region depends on the acceptable use of economic processes and products available in the region. The objective of sustainable development is to internalise the externalities, particularly the

economic, social and environmental aspects, and avoidance of irreversible environmental impacts. Among the dimensions mentioned in Nermend's (2009) work, the economic, social, environmental and spatial elements appear as critical.

In this summary (Table 2.1), it is observed that Kudelko (2004) presents the regional development factors in three aspects, namely the internal, instrumental and external aspects. The internal factor relates to the use of regional economic and social potentials. The external factor encompasses international determinants and does not depend on the economic scenario or policy effectiveness of regions. The instrumental aspect involves investment outlays and structure such as socio-economic system, inter- and intra- regional economic policies, institutional arrangement and territorial organisation. The same types of factors such as endogenous, exogenous and resource ability factors are mentioned by Strahl (2002) which include social, economic, environmental and spatial aspects of regional development.

These social, economic, environmental, and spatial aspects are so important for regional development that they are mentioned as individual factors by Markowska (2002) and Bagadzinski (1994). In addition, other factors such as resource, demand, attraction, political, and technological factors are also mentioned by Bagadzinski (1994), Markowska (2002) and Stimson et al. (2006). Though resource management and configuration is mainly evaluated from environmental perspective (Bagadzinski 1994), resource itself is evaluated either from spatial (Markowska 2002) or economic (Stimson et al. 2006) perspectives where functional arrangement and planning remains core. Resources, demand of assets and attractiveness of arrangement appear as crucial factors for regional development on a local scale.

Table 2.1: Dimensions and factors for regional development in various contexts

Kudelko 2004* (Dimension: Regional development determinants)	Strahi 2002* (Dimension: Transformation in regional space)	Markowska 2002* (Dimension: Strategic planning)	Bagadzinski 1994* (Dimension: Socio-economic activity)	Markowska 2002* (Dimension: Functional assets)	Stimson et al. 2006* (Dimension: Sustainable development)
Internal factors -Quantitative resources-Natural, financial and labour resources -Qualitative effectiveness-Human factor quality, financial resource quality, and economic structure **External factors** -International determinants -Economic policy (including interregional) **Instrumental factors** -Material investment -Investments in human being -R&D -Foreign investments -Socio-economic system -Economic policy -Intraregional policy -Institutional arrangement -Territorial organisation	**Endogenous factors** -Age structure of population, education status and qualifications -Entrepreneurship and innovativeness -Extent of local community integration in social organisations -Participation in regional power -Components and resources of natural environment -Spatial order, state of pollution, ecological awareness -Technical infrastructure and its potential for development -Regional budget, regional market structure, regional marketing concept **Exogenous factors** -Changes in macro environment of a region because of globalisation, integration, political and economic situation changes **Ability of resources factors** -Flexibility of economic structure -Internal capital potential -Openness and dynamism of regional policy -Competence and qualifications of regional and local authorities -Activity of community, -Infrastructure and intellectual resources	**Socio-cultural factors** -Population and its education, professional qualification, integration of community, living conditions, social institutions and services **Environmental factors** -Environmental pollution, environmental infrastructure, environmental awareness **Infra-technical factor** -Local, regional and supra-regional technical infrastructure -Organisation of infrastructure sectors -Infrastructural gaps, reserves and investments **Economic factors** -Economic resources, business activities, supply chain efficiency, local and regional markets -Economic base and competitiveness of cities and regions -External benefits, social cost, common goods and facilities **Spatial factors** -Land development -Functional-spatial arrangements -Spatial availability, order, arrangement and value	**Economic factors** -Capital growth, demand growth, population income, enterprises' profits, employment, investment outlays, -Work output and specialisation -Creation of modern management **Social factors** -Consumption increase and changes in its structure -Rate and character of urbanisation -Changes in regional awareness -Entrepreneurial attitudes -Improvement in self-government -Increase in educational status and activity **Technical and technological factors** -Technical and research base -Introduction of technical and product innovations -Improvement in production quality and technical infrastructure -Modernisation of material structure of manufacturing apparatus **Environmental factors** -Progress in environmental protection -Rationalisation of resources management -Implementation of closed cycles **Political factors** -Character of power, competence and rights -Way of exercising power and degree to societal acceptance	**Resource factors** -Level of assets -Availability of production factors -Production traditions -Infrastructure development standards **Demand factors** -Market absorption -Availability of external markets -Demand structure **Attraction factors** -Spatial development state -Access to services -Natural environment state -Social security	**Regional economic process factors** -Regional policy, planning, analysis, strategy -Use of resources **Regional economic product factors** -Regional employment, prosperity, investments -Infrastructure -Standard of living

Source: Nermend (2009) [* Authors are mentioned in Nermend (2009)]

Among other authors, Gawel (2013) states innovation as a factor in fostering regional development. Sorensen (2000) describes multiple drivers as development factors, including resource endowments, change in technology and production methods, individual lifestyle preferences, business and investor location decisions, business performance and human capital. This concept of Sorensen (2000) has been further extended by emphasising the involvement of private sectors, interest groups, community organisations and non-government leaders (Sorensen, Marshall & Dollery 2007). Braun (2005) expounds seven interdependent themes as regional development factors (the 7C framework), which are: connectivity, clustering, collaboration culture, community, communication, cooperation structure and change. 'Change' as a factor is dependent on the interactions of other factors. Overall, these factors of Braun (2005) play an enabling role in regional development. Magala (2004) argues identification of investment opportunities as regional development factor.

Gaffikin and Morrissey (2001) emphasise specifying regional niches, based on comparative advantage, linkage between spatial and economic aspects of the regions for regional development. Examples of this are the town centric regeneration or economic networking with city-regions, upgrading of living environments in the region, and improving household incomes, as well as social and spatial equity. The OECD (2011a) recognises the new development strategy to increase regional competitiveness and reduce regional disparities, which focuses more on endogenous assets and local firms, collective governance approach, a less dominant role of the central government, and opportunities in the regions.

The dimensions and factors of regional development, as discussed in this section are quite broad, multifarious, interweaving and are sometimes found to be overlapping. Social, economic, environmental and spatial

elements are quite commonly found as the basis for regional development dimensions and factors. To be simplistic, from a national context the dimensions and factors for regional development can be summarised as shown in Table 2.2. Though some of the factors are closely interconnected these basic dimensions and factors could be the building blocks for conceiving regional development strategy from a national context. It is important to find the correct balance among these dimensions and factors and their interrelationships, for adopting effective regional development strategy.

Table 2.2: Dimensions and factors of regional development in a national context

Dimension	Factors
Social	-social capital which includes social norms, values, trusts, conventions, social acceptance and links in society (social networks), pattern of communication, interaction and coordination (information exchange) -population densities and settlement -education, capacity enhancement and interactive learning opportunities -cultural achievements -social security
Economic	-employment, population income -business activities, enterprises' profits, supply chain efficiency and regional competitive advantage -entrepreneurship, innovation, and risk taking attitudes -financial and labour resources, investment outlays -globalisation, international determinants, political and economic changes -local and regional markets -economic policy, public-private partnership, organisational collaboration
Environmental	-resource scarcity and depletion, rationalisation of resource management -environmental sustainability -environmental awareness and progress in environmental protection -production traditions
Spatial	-spatial arrangements and development state -long term plan, planning capability and consistency and proactive leadership -resource endowment, resource configuration and resource sharing -infrastructure requirement and management -competence of regional and local authorities -cohesiveness and innovation capability in region -technology and its use and interaction -identification of organisations, and key stakeholders -identification of regional niches, dynamism of regional policy -regional network expansion -pro-activeness of leadership for regional affairs -utilisation of service providers

From organisational standpoint, contributing to each of these dimensions is important for regional development. In social dimension, the social capital is the basic factor that needs to be ensured. Information exchange, interaction and interactive learning, coordination and enhancing social capability in social networks are critical factors to contribute in social dimension for regional development. In economic dimension, the significant factors include employment generation, innovation, regional competitive advantage, supply chain efficiency, regional preference, organisational collaboration and public-private partnership. The environmental dimension includes factors related to resource configuration and environmental sustainability, environmental awareness, and progress in environmental protection. The spatial dimension include several factors among which long tern plan, planning capability, proactive leadership, regional network expansion, infrastructure requirement and management are critical from an organisational standpoint.

2.5 Approaches to regional development

Different approaches to regional development are seen such as conventional top down and bottom up approaches, sectoral approach, integrated approach, human rights based approach, infrastructure-led regional development approach, and organisational strategic approaches such as resource based approach, knowledge based approach and place based approach. In the conventional top down approach, the focus remains to the competitive advantages of a region and the re-locational attraction of other industries to the region for providing opportunities to the local residents (Adams & Buultjens 2010). The emphasis is given to market driven business ethos, development approval processes, urban business district development, tax incentives and relocation subsidies. The main challenges of the top down approach include relating economic development with social issues of the region, reliance on market demands

and relocation of other industries outside the region (Adams & Buultjens 2010).

The bottom up approach may suffer from the lack of decision making and planning efficiency and the lack of sufficient existing resources and equity to mobilize into functional context (Ascani, Crescenzi & Iammarino 2012). It may also fail to consider the broader economic context for the region (Eversole 2003). A mixture of both top down and bottom up approaches should be considered for a sustainable regional development (Eversole 2003).

The sectoral approach connects economic and social aspects and emphasises on industrialisation where agriculture is assumed to make its vital contribution (Kuhnen 2013). The sectoral approach is suitable in an environment where governance and institutional arrangements are weak (Foster 2000). But, the important bottleneck of the sectoral approach is that the only use of sectoral approach cannot overcome the existing deficiencies in the system which eventually in the long run increase the gap in living standards between the peoples in urban and rural areas (Kuhnen 2013). In addition to this disconnect, the lack of sufficient integration among different sectoral interventions may result inconsistent outcomes (European Union 2010). The integrated approach is then advocated to address the non-integrated sectoral approach where place based policy, multi-level governance and partnerships are crucial elements (European Union 2010; OECD 2013).

A human rights based approach to regional development is also in practice (ACFID 2010; Frech 2005). The objective of development activities in human rights based approach is to uphold the human rights codified in the international human rights legal framework (ACFID 2010). For example, project activities related to gender equity, empowerment of the poor, equity and freedom from discrimination and torture, fair trial,

health, education and housing contribute to regional development. Moreover, an infrastructure-led regional development approach (Gajewski, Bathiche & Wilczewski 2007) is recommended in literature. From policymakers' perspectives, the infrastructure-led regional development approach promotes distribution of infrastructure projects' net benefits between stakeholders groups (Gajewski, Bathiche & Wilczewski 2007). The major flaw of these two approaches in that they are not adequately focused on regional attributes and programs.

From organisational standpoint, a strategic perspective to regional development approach is important for effective involvement in regional development. Three approaches have been observed from strategic perspective such as resource based approach, knowledge based approach and place based approach. These three approaches have been discussed below in brief and have been evaluated in relation to port strategy in consistent to the research topic:

2.5.1 Resource based approach

A resource based approach to regional development emphasis on the effective and efficient application of advantageous resources to achieve regional competitive advantages (OECD 2011b). The resources should also be simultaneously valuable, rare, non-substitutable, and inimitable (Barney 1991). For example, a port infrastructure needs to drive its strategy for effective utilisation of its resources in order to achieve a competitive advantage.

The valuable resources of an organisation include its assets, competency, processes, skill base and knowledge (Kostopoulos 2002). The ability to integrate, generate and reconfigure internal and external resources, that is, the dynamic capability in a changing circumstance is important (Haezendonck 2001). These resources are strengthened when they produce a competitive advantage (Wheelen & Hunger 2002) not

duplicable in nature and not being implemented currently by competitors (Barney 1991).

2.5.2 Knowledge based approach

A knowledge based approach is regarded as an extension of the resource based approach (Hoskisson et al. 1999). Resources are same as resource based approach with special emphasis on knowledge as the dynamic element rather a generic resource (Halkier et al. 2010). In this approach, knowledge, innovation and consensus spaces (institution spheres agreeing for collaboration) provide impetus to integrate endogenous and exogenous strategies (Etzkowitz & Ranga 2010). A knowledge based approach places learning by community as the foundation of the strategy and supports innovation because of its systematic nature (Llerena & Matt 2005). Interactive learning space is critical in the knowledge based approach where face-to-face interaction is possible for spreading tacit knowledge (that is, non-codified knowledge). The sustainable competitive advantage is achieved through knowledge creation, continuous improvement and organisational learning (Salmi et al. 2001).

2.5.3 Place based approach

In place based approach, regional resources, opportunities, linkages, human capital and capacities (endogenous potential) are recognised as central (Cantin 2010; Tomaney 2010). Integration of goods and services, aggregation of local preferences, community participation, and the establishment of links with other places are the fundamental elements of a place based strategy (Tomaney 2010). The focus in place based approach also remains on the community's triple bottom line of social, economic and environmental returns on investment (Rangwala 2010). In this approach, the sustainable competitive advantage depends on distinctive, localised capabilities and is achieved by promoting knowledge sharing, innovation, collaboration, entrepreneurship, and regional preference (Bellefontaine

2011; Tomaney 2010). The driving factors for a place-based approach are collaboration; regional opportunity, talent, resources and constraints; jurisdictions and dimensions of sustainability; an adaptive learning process and knowledge sharing (Bellefontaine 2011; Cantin 2010; Raagmaa 2002). Strong and adaptable local institutes and interactive learning spaces, involvement of diverse range of stakeholders for identification, decision-making and configuration of regional resources are critical for place based approach (Bellefontaine 2011; Tomaney 2010).

In sum, the approaches to regional development are interrelated to each other. In order to contribute effectively in regional development, an infrastructure service providing organisation like port needs to assess the suitability of the approaches depending on the capability of the organisation, its internal and external environment, and potential and demand of the region. The ultimate objective of an organisation in adopting a strategic approach to contribute effectively in regional development should be facilitating in unlocking the potential of the region and capitalising on it.

2.6 Infrastructure and regional development

In general, infrastructure is a combination of physical and organisational structure provides links to services, markets, and jobs and facilitates quality of life (PRIF 2013). It is considered as a set of attributes which contributes to regional development as a production factor along with labour and capital (Rietveld 1989) and serve other industries, encourage new investment, facilitates economic and social activities, and generate a range of externalities in production and consumption (StudyMode 2013). Hall (2002) asserts that positive institutional willingness is required for infrastructure provision in a region, and once infrastructure is provided future investment and effective utilisation of infrastructure follows it as consequences. However, infrastructure alone cannot contribute to regional development rather it is a facilitating tool for creating an environment for

regional development. Gaffikin and Morrissey (2001) describe appropriate physical infrastructure as hardware for sustainable regeneration of a region, along with education, training, business attraction and social inclusion as software, and cultural synergy or desires as heartware. Infrastructure creates links among the social, economic and environmental matrix of a region, actively engage and provide rationales for other stakeholders in the region to contribute in regional development efforts.

Government strategy for investing in infrastructure has two dimensions. In a demand driven strategy, often referred to as a 'passive strategy', the government may provide infrastructure to resolve the bottlenecks of the private sector or market (Rietveld 1989). In a proactive strategy, the government may consider infrastructure as an engine for the regional development, to promote the potential sector of the region.

Transport infrastructure is one of the important infrastructures for regional development. The influence of transport infrastructure and its interplay with other regional development factors is always an intriguing issue for regional development, which needs to be evaluated (Rietveld 1989). Seaports, canals, airports, railway lines, railway stations and highways are considered important transport infrastructure (Rietveld 1994). This infrastructure is generally provided as collective input into production. A great deal of literature recognises the positive impacts of transport infrastructure on regional development (Ferrari et al. 2012; OECD 2002; Rietveld 1989; Rietveld 1994), though some authors note that providing improved transport infrastructure to peripheral regions, which does not have sufficient comparative advantage, may intensify market competition in these regions that may further result in wiping out of existing industries (Fujita & Mori 1996; Martin & Rogers 1995).

Besides human capital and innovation, transport infrastructure as an endogenous factor influences regional development, but research

suggests that it should be provided in an integrated way for the region to synchronise with the regional potential and demands and to avoid duplication (African Development Bank 2013; Infrastructure Partnerships Australia 2007).

The improvement of transport infrastructure increases efficiency in the supply chain and reduces transport costs, which may have two types of effects (Rietveld 1989). On the one hand, it can make export products cheaper, which can provide opportunities to expand total production and, because of economies of scale, ultimately increase production and employment in the region. On the other hand, lower transport costs can also make imported products cheaper. In that case, domestic products can partially be substituted by import products which may create diseconomies of scale and in turn may decrease production and employment in the regions.

From a transport infrastructure modelling perspective, Rietveld (1994) suggests that integrated urban land use - transport infrastructure supply models may yield limited impacts at the intraregional level because of the locational behaviour of firms having interregional orientation. Entrepreneurs' perceptions suggest that a positive impact may increase with the supply (Adaman & Devine 2002) of transport infrastructure at intraregional level. It appears that having collaboration and innovation among intraregional organisations is crucial to capture the benefits of transport infrastructure, since the entrepreneurs' perception is positive. Transport infrastructure has a substantial influence on the productivity of other production factors at the interregional level (Rietveld 1994).

An OECD (2002) report identifies that governments allocate resources to transport infrastructure investment in the belief that transport infrastructure has significant impacts on regional economies. It is important, but extremely difficult, to evaluate the relationship between transport

infrastructure investment and regional development. Some case studies in the report such as ‘Berrima and Mittagong Bypass in highway system’ in Australia and ‘Kristiansund Project on road tunnels and bridges system’ in Norway pinpoint clear objectives and specific strategic needs for infrastructure projects concerning regional development. It is also important to conduct *ex-ante* and *ex-post* evaluations for transport infrastructure projects which would further help policy coordination and infrastructure plans for the regions.

In comparison to other types of transport infrastructure, port infrastructure may have a greater contribution to regional economies, as they generate stronger externalities in the hinterland (Clark, Dollar & Micco 2004). Ferrari (2011) states that port infrastructure is now considered to be common capital for larger regions beyond the port-region. The benefits of a port are increasingly being spread to the wider world, leaving negative impacts in host port regions. The positive benefits of port infrastructure to the host regional economy have slowed down recently because of the change in the shipping market. The introduction of containers and their extensive handling systems reduce employment opportunities in the host port region (Brooks & Cullinane 2007; Musso, Benacchio & Claudio 2000).

Overall, infrastructure should be regarded as one of the essential and integral structural elements to regional development that facilitates liberating the potential of a region and operationalising economy and society. The objective of a sustainable infrastructure strategy should support economy, care environment, encourage innovation and boost quality of life in the region. Promoting innovation in a systematic way and participating in it is the cornerstone for effective infrastructure strategy to regional development.

2.7 Regional innovation system

From economic perspective, innovation is an important factor for regional development to achieve competitive advantages. Innovation, when elevated from the regional level, is more productive than the traditional top-down process (Colletis-Wahl & Pecqueur 2001). The regional innovation system (RIS) is a method that acknowledges innovation by a network of diverse players, through the use of the institutional framework of the region (Asheim 2007). The collaborative character of the innovation network supports the systemic approach of an RIS, where inter-dependency plays a vital role (Asheim 2007).

Diversification of regional know-how and use of regional assets remain at the core of regional development strategy (Colletis-Wahl & Pecqueur 2001), which an RIS can foster effectively. Clusters offer beneficial locations for businesses and industries and a favourable environment for innovation (Asheim 2007). A fundamental strategy is essential for the innovation which is provided by an RIS, as a framework for a region to support capability, innovation and competitiveness (Moulaert & Mehmood 2010).

Agglomeration, location attributes and infrastructure, networks, institutions and social capital, knowledge and interactive learning, and policy support are important factors for innovation at the regional level (Cooke, Gomez Uranga & Etxebarria 1997). These are described in brief below:

2.7.1 Agglomeration

The regional innovation systems are purposefully built to gain competitive advantage, further growth and sustainability, where clusters play a supportive role (Rip 2002). The systemic relation which flourishes in an intense agglomeration situation, with the support of quality infrastructure, is a pre-requisite for innovation (Cooke, Gomez Uranga & Etxebarria 1997). Asheim (2007) considers clusters and regional innovation systems

as synonymous and recognises that relationships between clusters and regional innovation systems follow localised, path-dependent inter-firm learning processes.

2.7.2 Location attributes and infrastructure

The attributes of locations, which can be natural or created by investments in physical and human capital, affect the innovation capability of regions (Gawel 2013; Ketikidis, Zigiaris & Zaharis 2010). These attributes, regarded as material infrastructure, can contribute to rapid social and economic changes (McCann 2001; Niemi & Jn 1975). This material infrastructure and its networks help to ease interactions within and between regions (Cook & Memedovic 2003; Johnston 2009).

2.7.3 Networks

Innovation is not an isolated phenomenon, rather it is generated through interactions among a set of networks, which include those of producers or firms, suppliers, consumers, infrastructure, research & development and knowledge networks (Sipikal, PisÃ¡r & UramovÃ¡ 2010; Sternberg 2000). Innovation networks can be regarded as a sub-set of a firm's general economic network. Innovation processes and networks vary from region to region (Nischalke & Schöllmann 2005) and so do the challenges. Innovation and innovation networks increasingly reduce the demarcation between regional and global businesses, functioning as a bridge between the two (Nischalke & Schöllmann 2005).

The service providing organisations at the regional level bring together various players in the innovation process, through their apparently embedded knowledge based services (Mas-Verdu, Ribeiro Soriano & Roig Dobon 2010). By doing this they motivate and bring together suitable components for innovation processes and market success. For example, ports provide services as nodes in transport and supply-chain networks

through their infrastructure to transport goods smoothly to the destination. Strategically, the spatial status and services of ports may help them act as platforms to patronise regional innovation.

2.7.4 Institutions and social capital

Innovation systems are also influenced by the institutional, organisational and cultural atmosphere of the region. Institutions and organisations are like soft and hard institutions, where the soft institutions are the 'rules of the game' that include norms, rules, routines, convention, standards and legal settings - in short, the elements which help form social capital. Organisations, hard institutions, are like 'actors' or 'teams' that participate in the game which is embedded in region (Cooke & Morgan 1998; Cooke, Uranga & Etxebarria 1998). 'Institutions, relationships, attitudes and values governing interactions amongst people' regarded as social capital (Iyer, Kitson & Toh 2005) is the backbone for continuous innovation (Beer, Maude & Pritchard 2003).

Social capital is a 'resource to action' for the networks and together with trust, shared norms, values, and understanding serve to facilitate coordination and cooperation within or among groups or businesses (Woodhouse 2006). Research also supports the premise that higher levels of social capital increases investment, engenders better governance and economic growth and encourages regional innovation (Beer, Maude & Pritchard 2003; Iyer, Kitson & Toh 2005; Woodhouse 2006). Constructive organisational activities depend on a higher level of social capital, which acts as a positive catalysts for regional innovation development (Moulaert & Mehmood 2010).

2.7.5 Knowledge and interactive learning

Knowledge is a crucial element in innovation processes (Fallah & Ibrahim 2004). The fundamentals of knowledge have three categories, these are:

scientific knowledge, technological knowledge and entrepreneurial knowledge (Asheim & Coenen 2005).
Asheim (2007) identifies three bases of knowledge - analytical (new knowledge), synthetic (existing knowledge) and symbolic (recombination of existing knowledge). He analyses the pathways of innovation processes as- 1) new scientific knowledge oriented innovation process 2) existing knowledge oriented innovation process and 3) innovation process by applying existing knowledge in new ways.

Innovation stimulates value creation through regional resources. The capability of value creation does not depend only on resources exploitation but also on exchanging and combining existing resources and knowledge (Mas-Verdu, Ribeiro Soriano & Roig Dobon 2010). Lyer, Kitson & Toh (2005) state that tacit (non-codified) knowledge is essential for innovation. It is mostly generated through face-to-face interaction and helps to spread tacit knowledge in the learning region. Learning comes as a strategic element in the process of innovation (Cooke, Gomez Uranga & Etxebarria 1997). In knowledge economies, innovation is regarded as an interactive process, rooted in an institutional and cultural environment on a social and regional base (Asheim 2007). A platform and leadership is required within clusters or regional innovation system to nurture and proactively coordinate the learning processes (Pekkarinen & Harmaakorpi 2006).

2.7.6 Policy support

Innovation is considered a significant factor for economic dynamism and a source of competitive advantages (Mas-Verdu, Ribeiro Soriano & Roig Dobon 2010). As a result, innovation policy remains at the core of regional and national economic development policies (Asheim 2007). Regional innovation systems demand a favourable business climate for enterprises, while the goal of regional development is to ensure better living conditions in regions. Raagmaa (2002) argues that these objectives are contradictory in nature. Nischalke and Schollmann (2005) states that when considered

individually, immediate policy objectives of regional development and regional innovation are different. Whereas regional development policy focuses on the overall improvements in standards of living and the immediate needs of the region; regional innovation policy focuses on competitive advantages and further growth of the regions. Innovation policy cannot be fully consistent with regional development policy but the former can be supportive of the latter (Sipikal, PisÃ¡r & UramovÃ¡ 2010).

Trade-offs is required when the regional development agenda combines innovation with broader social objectives. Both policies should be complementary with each other where a balanced tailoring is required, depending on the strengths and needs of the regions (Nischalke & Schöllmann 2005). In terms of policy for innovation, regional innovation system is emphasised for the execution of long-term development strategies (Asheim 2007; Cook & Memedovic 2003). The regional development and regional innovation policies are complementary although their immediate objectives may be different. The appropriate balance between the two is important for the sustainability of both policy goals, which mainly depends on the economic, political and cultural conditions in the region (Nischalke & Schöllmann 2005).

Overall, an effective innovation is a bottom-up approach. The organisations embedded in the region require promoting an RIS and participating in a collaborative way in it, because they are the parties well aware of local knowledge, services, strengths, and constraints which are essential to build up partnership for competitive advantage and innovation. Government and development agencies may coordinate among innovation networks, but these are not always sufficient. In coordinating networks, if organisations and service infrastructure involved in regional innovation remain vigilant in their strategies, innovation could bring effective and meaningful impacts for regional development.

2.8 Summary

The objectives of regional development include the sustainable improvement of livelihood through unlocking the potential of a region. Regional development is an important issue, both nationally and internationally, because of its multiple and diversified strategies with its unilinear objectives.

This chapter has discussed the fundamental issues of regional development. The factors affecting regional development have been reviewed and summarised in a national context. The approaches to regional development have been discussed from an organisation's strategic standpoint. Infrastructure and its role to regional development have been reviewed and regional innovation system has been evaluated as a method to achieve regional competitive advantages. The outcomes of this chapter reveal that an organisation should be involved in social, economic, environmental and spatial dimensions to contribute to regional development. Promoting and participating in an RIS should be the cornerstone for the strategic approach of an organisation to effective involvement in regional development. Transport infrastructure is one of the important factors for regional development, where ports are critical elements. The next chapter will discuss the roles of a port in its region as a critical factor for regional development.

CHAPTER 3: THE ROLES OF A PORT IN ITS REGION

3.1 Introduction

The previous chapter reviewed the fundamental issues of and approaches to regional development. This chapter presents the roles of a port in relation to its region and regional development. A port is not only a transport hub but it also influences the local attributes of the region it services (Bryan et al. 2006). The roles of a port are influenced by the geographic and economic characteristics of its setting and a strong relationship exists between the port and regional development (Cahoon, Pateman & Chen 2013). The services provided by ports stimulate the regional economy and contribute to the overall national economy and thus ports are national assets. In this context, this chapter explains the perspective of a port-region and defines a regional port in a national context. It then discusses ports functions, governance, port-city relationship and corporate social responsibility which have sufficient influence on ports' role in their host regions and regional development. Subsequently, the roles of ports and port authorities, and port strategies are discussed. These main issues related to ports' roles in their regions and regional development are discussed from a general perspective owing that there is very limited literature looking at them from a regional port perspective. The finding in this chapter will be a basis for investigating how regional ports in national context are involved in their host regions and regional development.

3.2 Defining a port-region

Defining a port-region can be a dubious and contentious issue because of the ambiguity in geographical delimitation around a port. A port-region may influence a port's role due to the ever changing global trade patterns and emerging business opportunities. Improvements in transport

technology reduce transportation costs and consequently allow more freedom of choice for port users. This can have a considerable influence in a port-region. The emphasis should be given on port's influence in a network situation in defining a port-region.

A precise definition of port-region is important to understand port development and regional challenges. However, it is a multifaceted, non-specific concept, where the possibility of expansion is always present (Ducruet 2009) There are two ways of defining a port-region; one is to label a port-region geographically, and the other takes into account the fact that ports integrate widespread networks and various transport chains (Ducruet 2009). The former one is more conservative to geographical delimitation, while the latter one provides flexibility to illustrate the influence surrounding a port keeping the geographical setting of port as an inevitable context.

Table 3.1 shows that the common denominator in defining a port-region includes the geographical delimitation and the economic activities surrounding a port. The social aspects (De Langen 2008; Wilmsmeier, Monios & Lambert 2010) and environmental aspects (Rodrigue, Notteboom & Pallis 2010) surrounding a port have been included later, because of the fact that the economy circles around a society; a society exists with its environment and any economic activity has environmental impacts which need to be addressed.

A port range, where a number of ports support mutual sharing of land and sea services (Ducruet 2009), and a port system, where a group of ports in close proximity to one another share a common hinterland (Rodrigue, Comtois & Slack 2009) are also related to a port-region concept. Ducruet (2009) includes transport and logistics linkages to ports, inter-port relations, and ports hinterland dynamics in illustrating a port-region.

Table 3.1: The synopsis of defining a port-region

Reference	Context of a port-region
Vleugels (1969)	A port-region is the district in which the port is located and whose economy is greatly influenced by port activities
Davis (1983)	A port-region as the immediate hinterland of a port and the political jurisdictions surrounding it
De Langen (2008)	A port-region is the primary port area including adjacent municipalities with transport and logistics links
Ducruet (2009)	A port-region as an economic area surrounding a port, linking logistics areas and inter-port relations
Wilmsmeier, Monios and Lambert (2010)	A port-region is a local area near a port
Rodrigue, Notteboom and Pallis (2010)	A port-region as a port's local environment

A port-region may stretch beyond national borders and differ from the port hinterland concept in economic structure (Vleugels 1969). The port hinterland can also extend beyond the port-region, because of transport connectivity and port-regionalisation (Ducruet 2009). The port-regionalisation refers to the market driven expansion of port related activities that extend beyond the port and create a regional network where functional interdependency, joint development efforts and multimodal logistics platforms are the main elements (Notteboom & Rodrigue 2005). It is important that a port-region concept should include the regional network of a port related dynamics that may exceed port hinterland.

Figure 3.1 shows a conceptual port-region where port's influence and network exceeds the geographical delimitation. The circles in Figure 3.1 indicate that port activities and port user activities can extend beyond the port and its administrative district.

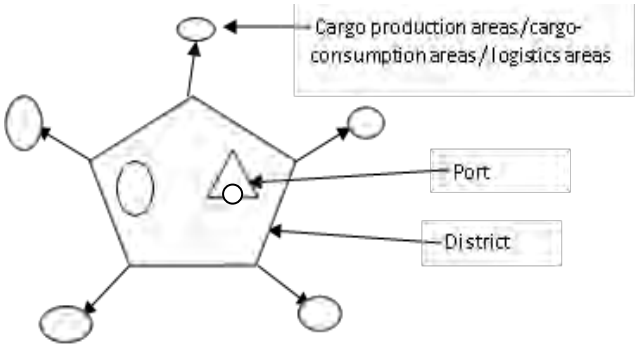


Figure 3.1: A conceptual port-region

In summary, a port-region refers to a port's expansion and growth in a multi-dimensional network in the geographical area around the port. From this perspective, a port-region might be regarded as the administrative district in which a port is situated connecting the port hinterland where port activities and port users' activities induce and influence the social, economic and environmental sphere of life. This overarching conceptualisation of port-region fits with the Australian regional ports scattered along the vast coastline having a varying degree of proximity, contestable hinterlands, and geographical characteristics with the neighbouring ports (Sakalayen, Chen & Cahoon 2013).

3.3 Defining regional ports

Different port classifications exist all over the world (Bichou 2009), but there is an absence of a precise definition for regional ports. As indicated in chapter 2, a region can be defined in terms of international and national context. With the concept in general, a regional port can be viewed from a broad (supra-national or international) and a narrow (sub-national or national) perspective. The understanding of regional ports from national and international perspectives differ in terms of the size of the ports, hinterlands they serve, types of cargo they handle, proximity to the shipping route, and shipping services or number port calls.

Bichou (2009) views regional ports from a hinterland or geographical market perspective whose influence may reach beyond national borders. This statement may explain a regional port in an international context as a port serves a hinterland covering geography of multiple nations, for example, Port of Rotterdam may be regarded as a regional port in North-West Europe region as its hinterland is beyond the Netherlands.

From the national perspective, literature has shown various descriptions on a regional port. One view is that a regional port is a small or medium size port in terms of throughput and jurisdiction. For example, Vleugels (1969) describes small ports in terms of throughput as regional ports which only handle cargo imported into or exported from the respective port-region. The captive nature of cargo of these ports is protected against the competition of other ports. UNESCAP (2002) describes regional ports as being small ports outside global premier ports and focuses on developing these ports as regional logistics centres. Debrie, Gouvernal and Slack (2007) identify regional ports as being small and medium size ports under the jurisdiction of a lower tier of government, having limited or no private sector involvement. Lam and Iskounen (2008) define regional ports based on criteria such as throughput range (50,000-300,000 TEUs), feedering service through the port and direct regional (short sea) calls. Magala (2008) describes regional ports in the Australian context as ports under the shadow of metropolitan or capital city ports. Other views on regional ports in a national context include Haynes, Hsing and Stough (1997), who regard regional ports as a platform between political and commercial centres in a region having access to regional and global economies, and (Ghashat 2012), stating that regional ports are also of additional capability to trade with neighbouring countries and serve specific regions of a country.

It is noted that recent literature also refers peripheral ports as regional ports in a national context. Monios and Wilmsmeier (2012) illustrate

peripheral ports as local ports in Scottish context having geographical and institutional indifference, with limited share of total freight traffic. McLaughlin and Fearon (2013) define regional ports as small peripheral ports that contribute to regional and national economies. Peripheral ports have been described earlier by Slack and Wang (2002) as the port beside dominant container hub ports. These ports have characteristics such as lower labour and land costs leading to cost differentiation opportunities, transhipment opportunities, close proximity to main shipping lanes, private sector involvement providing dedicated berth facilities for shipping lines, and separate institutional authorities. From the above discussion, peripheral ports have few similar characteristics of regional ports in a national context such as both are ports outside metropolitan cities, with challenges of limited share of freight, and away from the main shipping lanes.

The literature has used various terms for regional ports, such as local ports, small and medium size ports and small peripheral ports. Adopting the definition of an Australian region as ‘non-metropolitan and rural areas’, this study focuses on regional ports in a (sub) national context and defines regional ports as the ports outside metropolitan cities serving regional businesses. Although some researchers used the term ‘regional port’ in their studies for global container or metropolitan ports, for example, Wang and Slack (2004) and Zhao, Liu and Yang (2007), it is different from the regional port defined by this study. Metropolitan ports and global container ports normally have bigger hinterland covering multiple regions within the nation or cross the border, while regional ports have relatively small hinterland covering mainly a region within a nation. In order to distinguish between regional ports and metropolitan ports or dominant container ports, Table 3.2 presents the characteristics of regional ports and Metropolitan ports/dominant container ports.

Table 3.2: Differences in characteristics between regional ports and metropolitan ports/dominant container ports

Regional ports	Metropolitan ports/dominant container ports
Hinterland is relatively small and the ports are mainly involved in export cargo handling	Hinterland is bigger by involving different regions in a nation or cross nations. Ports are involved in export and import containerised cargo.
Serves regional (sub-national context) businesses and important for regional economy and social well being	Contribute to the entire economy of a country or the region cross borders.
General and bulk cargoes are mainly focused. Some ports are also involved in containerised cargo	Mainly containers focused
Peripheral to main shipping lanes	Located in the main shipping routes
Limited ship calls	Adequate ship calls among which most are international
Rare transhipment facilities	Sufficient transhipment facilities
Growing private sector participation in ports	Active private sector participation/ Some ports are private

Few studies have been found which investigate regional ports. For example, Hall (2002) investigates regional ports in the US and describes these ports as niche ports, having dominant feeder services with central hub ports. In the UK, Evans and Hutchins (2002) assess the role of Liverpool's port in the context of economic development and regional competitiveness. Similarly, Bryan et al. (2006) assess the contribution of regional ports located in industrial South Wales to the economic and social needs of the region. They conclude that the overall contribution of those ports to the economy is rising because of the increasing importance of ports in supply chains and logistics processes. Recent research undertaken by Monios and Wilmsmeier (2012) analyses regional ports in Scotland. The study undertaken by Ferrari et al. (2012) covers a broad range of European regional ports (but few metropolitan ports are included) to assess their economic contribution to regional development.

In Australia, Chen, Cahoon and Haugstetter (2010) and Cahoon, Pateman and Chen (2013) explore the relationship between a regional port in Tasmania and its region and suggest the port should be involved in the regional innovation system for mutual growth of the port and the region. Chen et al. (2012) investigate the challenges of Tasmanian regional port development and conclude that regional port development should be based on a broader view of its sustainability, contribution to the supply chain and regional economic development.

As regional ports have the interdependency with their hinterlands for their mutual development and growth (Cahoon, Pateman & Chen 2013), it is important to examine the strategic role of a regional port in its region to regional development. Before examining the roles of regional ports, it is important to understand the concepts of regional ports' functions, governance, port-city relationships and corporate social responsibility because these issues have sufficient influence on ports role in region and regional development. However, there is very limited literature discussing these issues purely from a regional port perspective rather from a general perspective. Hence, these issues will be discussed in the following sections based on a general context. Consequently, the roles of ports in their regions and strategies in a general context explored in this chapter will theoretically underpin the empirical study for regional ports in a national context, that is, Australian regional ports in this research.

3.4 Functions of ports

Different functions of ports are the basis to play a broad role in their host regions where the port authority is the main player. The functions of ports are defined by the services and activities they provide. The roles of a port and port authority will be discussed further in section 3.8 and 3.9 respectively.

Verhoeff (1981) states that ports can be distinguished by their transport, commercial, industrial and social functions. Providing shelter and support services for ships, handling cargo and passengers, linking various modes of transport, and acting as a base for industrial development are the main functions of a port (Branch 1986). Alderton (2008) lists ports' functions and features in three broad categories such as civil engineering functions, administrative functions, and operational functions (Table 3.3).

Table 3.3: Main functions and features of a port

Civil engineering functions	Administrative functions	Operational functions
• Sea and land access • Infrastructures for ships berthing • Road and rail network • Industrial area management	• Control of entering and leaving the port • Environment control • Dangerous goods control • Safety and security • Immigration, health, customs and commercial document control	• Pilotage, tugging and mooring activities • Use of berths, sheds, etc. • Loading, discharging, storage and distribution of cargo

Source: Alderton (2008, pp.4-5).

Among the functional elements under these categories the connectivity between ports and road and rail network, sea and land access, industrial area management, and environment control have direct influence on the port-region. A port can be pivotal for regional development and can stimulate economic growth in the area surrounding it (UNCTAD 1985). UNCTAD's *Monographs on Port Management* and the *World Bank's Port Reform Toolkit* include services to ships and services to cargo as main functions of ports. Bichou (2009) summarises port functions by types of asset and facility from an infrastructure perspective as illustrated in Table 3.4. It is important to explore whether a port can source from its host region or not while providing the services which may have impacts on social and economic aspects of the region.

Table 3.4: Breakdown of port functions by types of asset and facility

Nautical infrastructures (marine services)	Quay and berth infrastructure (terminal services)	Port superstructure (logistics and value-added services)
• Conservancy and protection • Access and navigation • Shipping services • Vessel traffic management • Dredging and maintenance • Repair and maintenance	• Pilotage and towage • Berthing • Bunkering and supply • Ancillary services • Stevedoring and cargo handling • Quay transfer operations	• Cargo storage and stacking • Equipment services • Distribution and related services • Information processing • Real estate and rental services • Logistics and value-added services

Source: Bichou (2009, p.35).

The UNCTAD's (1990, 1992b) four generation port model also illustrates the progression of ports' functions staring from cargo handling related services, to commercial services such as cargo distribution processing and cargo transformation with industries, to value added services, and finally to supply chain integration and efficiency through standardisation of information and its flows. Verhoeven (2010) raises concerns about the static nature of UNCTAD's (1992b) port generation approach for port development. Despite the fact that this approach is static and presents separate snapshots rather than a view of port evolution, it provides valuable insights into the development of port functions.

In sum, the functions of ports primarily create the base for ports' broader roles in their host region. Most of the functions are technical in nature but they have enormous benefits in social and economic aspects while satisfying the demands of the region. These functions also have negative impacts on the environment of the region. It is important to explore the levels of regional preference and regional stakeholders' involvement in performing these port functions.

3.5 Port governance

Port governance refers to the institutional and organisational structures of a port where port administration plays a pivotal role in governing the port (Brooks 2004; World Bank 2008b). The main criteria in forming institutional and organisational arrangements for ports are mode of administration (central or local), institutional framework (public or private), regulatory and policy framework (protection, liberalisation, market regulation) and labour affiliation and organisation (Bichou 2009). Port governance includes port ownership and port management. The types of port authority are part of the port management/administration model. Figure 3.2 illustrates the structure of port governance. The port authority is the key player in the port management model and exists at the cumulative point among various interacting bodies in port. It represents the port ownership, governs the port, and plays a major part in shaping the role of port in the region. Port devolution is also discussed in section 3.5.3 as it is an important part of reform process of restructuring port governance over time.

3.5.1 Port ownership

The on-going discussion around port governance reform includes the level of port privatisation, corporatisation models of port management and their impact on port performance (De Langen 2013). Increased private sector involvement in larger ports can support effective commercial interests (Baird 2000; Bichou 2009). However, the public interest in ports cannot be avoided (Debrie, Gouvernal & Slack 2007) because of the impact of development of the region in which the port is located. In broad terms, the port ownership model considers the degree of privatisation and designates port ownership as public, public-private, private-public, or private (World Bank 2008b).

The port owner may be the state, the local government, the municipality or an autonomous body or private party (Baird 2000; Bichou 2009). Increasing private sector investment and involvement in port activities has

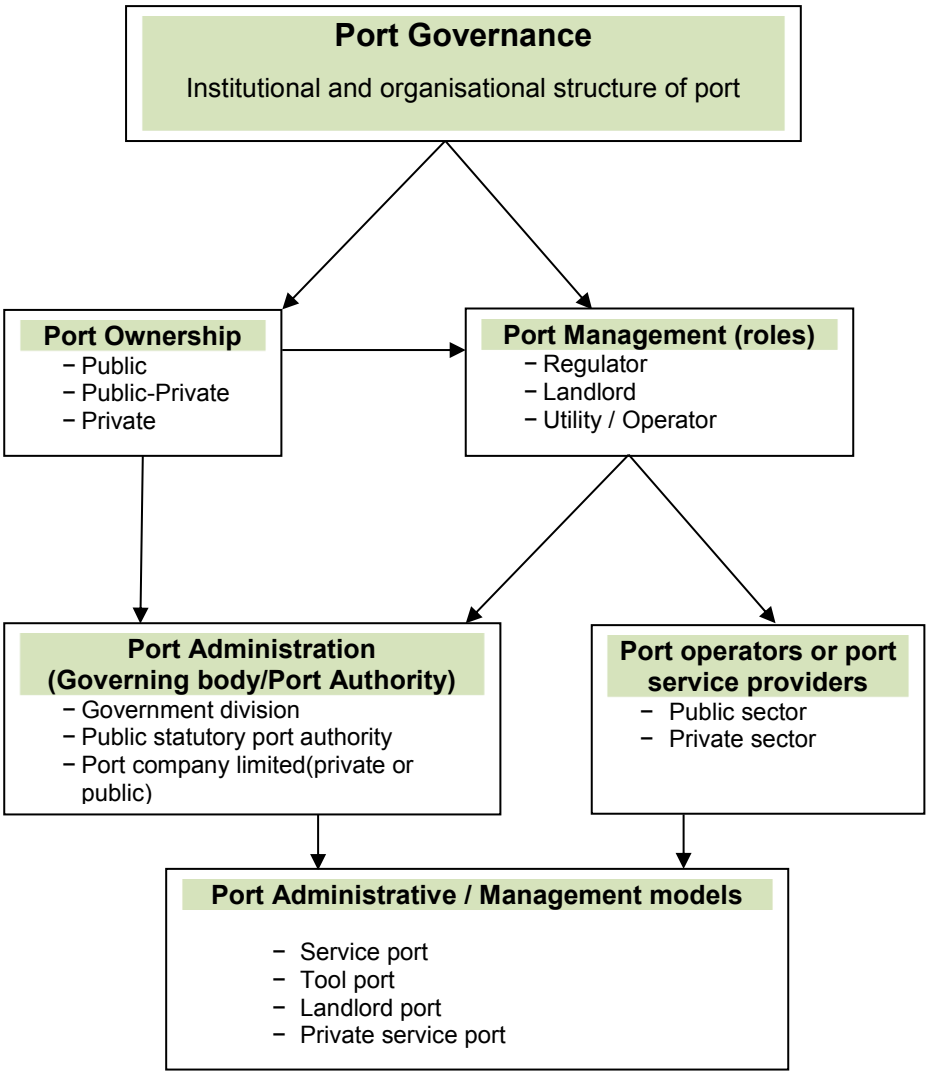


Figure 3.2: Structure of port governance

had a significant impact on port governance (Brooks 2004). The unitisation in cargo handling, increasing congestion in metropolitan or international ports and service failures, coupled with the inability or reluctance of local governments to channel investment into port infrastructure (World Bank 2008a), leaves regional ports in the national context open to private sector involvement.

3.5.2 Port management

Port management involves both the port authority and the port operators. The port authority is a governing body which administers port activities (World Bank 2008a). The port management can be categorised as regulatory, landlord or utility depending on the ownership of the port (Brooks & Pallis 2011). The World Bank port reform toolkit presents four port management/administrative models which determine the types of port authorities. These port management models are- public service port, tool port, landlord port, and private service port (World Bank 2008b). The socio-economic structure of a region, historical developments, port location, and types of cargoes handled in that port influence the choice of a port administrative model. The strengths and weaknesses of these four port management models (Brooks 2004; World Bank 2008a, 2008b) are discussed below.

The public service port model is predominant where the port authority owns the land and all assets, employs the labour force, offers port services, and executes regulatory functions (World Bank 2008b). The port authority is headed by a civil servant and is accountable to a government ministry. The unity of command and management is an advantage of this model, but there are a number of disadvantages such as the lack of internal competition and innovation, less flexibility in problem solving particularly in regard to labour issues, inefficient port operation and

administration, dependency on government budget, and the possibility of wasted resources and underinvestment (Brooks 2004).

In the tool port model operational responsibilities are split between port authority and private operators. The port authority owns the land, the infrastructure and the assets and it provides the labour force for cargo handling. Private firms perform cargo handling services on board vessels, on the quay and in the apron area (World Bank 2008a). The public sector, the private sector or a combination of both may perform marine and nautical services. The advantages of this model include prevention of duplication of facilities, as the public sector provides the infrastructure and equipment (Brooks 2004; Brooks & Cullinane 2007). It is a better primary model for port reform initiatives and effective as a transition to the landlord model as it creates confidence in the private sector. The weaknesses of this model are due to the division of responsibilities, and can include double handling of operations, competition for equipment and lack of control over labour efficiency and cargo handling efficiency.

The landlord port model is relatively broad with a strong mix of public and private responsibilities. The port authority owns, maintains and develops the land and infrastructure and acts as a regulatory body. The infrastructure is leased to private operators to cater for port operations (World Bank 2008b). In this model, the port authority assumes the responsibilities of economic expansion, long-term land development, and basic infrastructure maintenance such as quays, docks and roads. Private operators buy, install, and maintain their own superstructures including some physical facilities such as offices, sheds, warehouses, container freight stations, and workshops (Baltazar & Brooks 2007). Private operators also employ dock labourers, though some exceptions may exists where port labourers are employed through a port wide labour pool system. The strength of this model is that the private sector owns the cargo handling equipment and superstructure, and executes cargo

handling operations, thereby ensuring efficiency, accountability, responsive market dynamism and leadership, and better labour management. The weaknesses of this model include the possibility of conflict between public interest and private sector objectives, the risk of over-capacity, and duplication of marketing efforts from both the port operators and the port authority (Brooks 2004).

The private service port model presents an extreme form of port reform, where a private investor owns the land, infrastructure, and superstructure; provides the labour force; and develops and conducts all port services (World Bank 2008a). Regulatory functions may also be undertaken by the private sector, although some exceptions may exists where regulatory and statutory functions may be executed by the public authority to control monopolistic behaviour (Baltazar & Brooks 2007). The strength of this model is the flexibility in port investments, operations and management due to the absence of government or political influences. Greater efficiency may be achieved in asset and human resource management, market oriented port development and tariff policies. On the other hand, the possibility of monopolistic behaviour by the private sector, the possibility of core port business not being completed, for the lack of government planning for long-term economic development are some weaknesses of this model (Brooks 2004).

Various combinations of these port administrative models are possible and this is the case in many parts of the world (Debrie, Gouvernal & Slack 2007). As a result, there is no standard or best practice for institutional structure for ports (Bichou 2009). The role of the community in port governance is also unclear (Debrie, Gouvernal & Slack 2007).

3.5.3 Port devolution

Port devolution is the allocation of duties and responsibilities between public and private sectors involved in port operations (Brooks & Cullinane

2007). It is part of a port reform process on which port ownership has immense influence. The objective of port devolution is to delegate port operation functions to the private sector in order to ensure better port management (Sanchez & Wilmsmeier 2007). Decentralisation, corporatisation, commercialisation and privatisation are regarded as the means of port devolution (Brooks & Cullinane 2007).

Everett (2009) and Ghashat (2012) describe port devolution in detail: Decentralisation is the separation and relocation of administrative functions to a new government entity to increase its involvement in finance and administration. It can be used with other means to increase private sector participation.

Corporatisation is a corporate structure established through legislation with a reduced government presence, whereby the commercial operations of a port are transferred to the private sector. The ownership, capital assets, responsibility and risk are transferred to a corporate entity. Corporatisation may have characteristics of both commercialisation and privatisation.

Commercialisation is a system of operating and managing ports based on commercial principles with similar objectives as corporatisation but established without changing legislation. In commercialisation, the government retains ownership and control of the port. The private sector performs various commercial activities such as trade facilitation, marketing and promotional tasks. Lastly, privatisation is a process in which public ownership, port assets and liabilities are transferred to the private sector in part or in whole, through lease or sale of the port.

Depending on the extent of port devolution other port ownership models may also emerge such as autonomous ports, corporate ports and trust ports (Bichou 2009). An autonomous port holds public decision making

power for port operation, policy and management, while a corporate port can be either a limited company or a statutory port corporation. The former is owned by the government or private sectors. A trust port performs as an independent statutory corporation controlled by a self-governing trustee board.

Port devolution is a contentious political issue because it creates opportunities and challenges in response to changing circumstances (Brooks 2007). In this context, the opportunity for the community to participate in port development should be considered. For publicly owned ports, the port management has an obligation to consult with the community over any port modifications which impact on the region (Fawcett 2007). In private ports this community involvement is not mandatory. There is strong political motivation to find a balance between public-private partnerships for effective port governance. Since the political scenario for each port varies from place to place, it is important to adopt a contingency-based approach for port devolution which takes into account the characteristics of an organisation's environment, resources and capabilities (Baltazar & Brooks 2007). The most effective method is based on links between external and internal environments of an organisation where community groups are consulted and public-private partnerships are balanced.

The impact of port devolution may include encouragement of greater private sector participation; greater efficiency, faster response to customer demands and better performance in terms of profitability; reduction of government involvement and public debt; increased ability for management and unions to face market realities; and access to alternative sources of investment (Brooks & Cullinane 2007; Ghashat 2012). In Malaysia for example, the Port of Tanjung Pelepas gained increased investment and improved efficiency in cargo handling and later became a transhipment hub, and the Port of Kelang enhanced its role as a national

load centre. But these ports have characteristics of metropolitan or global container ports. Similar impacts of port devolution have been seen in The Philippines, Thailand, Syria and some Latin American countries (Ghashat 2012). It would be interesting to explore whether port devolution in regional ports in the national context is required or not.

Baltazar and Brooks (2007) suggest the separation of regulatory functions from other port operations to avoid conflict of interest. They claim that the transfer of regulatory functions to private operators may have drawbacks as it can create a conflict of interest between operating and monitoring functions. In the short term, deregulation associated with port devolution may have a negative impact on efficiency due to the costs associated with switching from a regulated to a deregulated environment (Brooks & Cullinane 2007). Ghashat (2012) warns of a reduction in employment, but the opportunities for employment may increase as port activities increase. For example, in Australia and Argentina the implementation of a devolution policy resulted in a smaller workforce, but in Mexico employment rose in line with increased port activities (Estache, González & Trujillo 2002; Ghashat 2012).

Port devolution in regional ports can present many opportunities and challenges. The research on port devolution mostly covers international ports whereas the situation in regional ports remains largely unexplored. Debrie, Gouvernal and Slack (2007) report that in some French and Canadian regional ports the performance of decentralisation, evaluation of commercial success, and administrative structure still need to be investigated. Ghashat (2012) found that devolution of some Libyan regional ports may make them competitive players in the region if technical performance can be improved. In Australia, the corporatisation of ports has been criticised because of political interference where the government retains the majority of shares but allegedly releases ports from government intervention, a situation which could be resolved through

adoption of the private model (Everett 2003, 2007; Ghashat 2012). This privatisation became very evident when New South Wales, Queensland and South Australia privatised some of their regional ports (Sheppard 2013).

3.6 Port–city relationship and regional development

The port-city relationship brings complementary benefits to a region. Port cities are not only cities on the coastline, but environments where people, goods, cultures, knowledge and information combine to enrich the life of a city (Tan 2007). The enrichment of city life is one of the main objectives of regional development. The ports and surrounding cities interact with each other in various ways, such as economic, social, environmental and cultural (World Bank 2008a) and shape the port-city relationship.

In the port-city relationship, the location of a port provides advantages for trade and urban development and creates economic dynamism in the region (Fujita & Mori 1996). Bichou (2009) considers port development as a spatial and regional phenomenon, and claims that the relationship between port-cities and their hinterlands is influenced by economic development, industry specialisation, and trading relations.

The creation of a city can begin with the establishment of a port (Fujita & Mori 1996; World Bank 2008b). Alternatively, the economic activities of a place on the coast can necessitate the establishment of a port (Ducruet 2007). Whichever is the process, the growth of port and city go together and the relationship between them remains interdependent in nature (Goss 1990b). However, the port-city relationship may weaken because of rapid industrialisation, technological development, mechanisation and specialisation of port work, increase of scope and operational scale which eventually shifts port activities away from the city (World Bank 2008a). This relocation of port activities generates redevelopment issues in the port, in which three types of approach are apparent (World Bank 2008a).

Firstly, the port authority may undertake the redevelopment and may widen its role as a property developer. Secondly, the port authority may transfer the task of redevelopment to a local authority or municipality. Thirdly, if the dock area is large and involves several municipalities, a special development corporation may be formed to coordinate the redevelopment.

Hoyle (2000) indicates that the waterfront redevelopment zone can be an area of conflict, where stakeholders do not always agree. The reconciliation of these differences is one of the main problems in waterfront redevelopment (Hoyle 2000). Merk and Notteboom (2013) assess main challenges in port-city development in Rotterdam and Amsterdam, and conclude that challenges that are related to the evolving interaction between ports and cities are common in many port-cities all over the world. They state the relation is complex, that is: ‘ports need less labour but have become more capital and space intensive, which naturally conflicts with space constraints in growing metropolitan regions.’ (p.9) Moreover, port developments have intensified an unbalance of benefits and negative impacts connected to ports, with benefits from ports overflowing across the metropolitan boundaries, but with negative impacts highly localised. The port authority should be an important player in this conflict resolution process.

Fujita and Mori (1996) investigate the neo-classical port-city model, which is based on competitive advantages and constant returns. This model is dependent on conditions such as climate or soil, production factors such as labour, confined capital, raw materials, mineral deposits, and cheap water access. However, the neo-classical model does not account for of the eventual decline of competitive advantage and constant returns. Therefore Fujita and Mori (1996) propose a complementary port-city model which emphasises increasing returns and endogenous agglomeration. This model explains how the continuous growth of the port-city is

generated by self-reinforcing agglomeration forces which eventually create a lock-in effect for the port-city. The complementary port-city model represents a synergetic relationship between the port and the city, and creates scope for innovation and regional development in the region, in which the port authority can play a pivotal role.

Ducruet (2007) cites hinterland concentration as an indicator of a successful port-city relationship. The patterns of hinterland concentration are different in various port-cities, as shown in Figure 3.3 (Lee, Song & Ducruet 2008). The interplay between port and city is complementary and shows hinterland growth and port co-operation as the basic characteristics of port-city evolution in the regional setting.

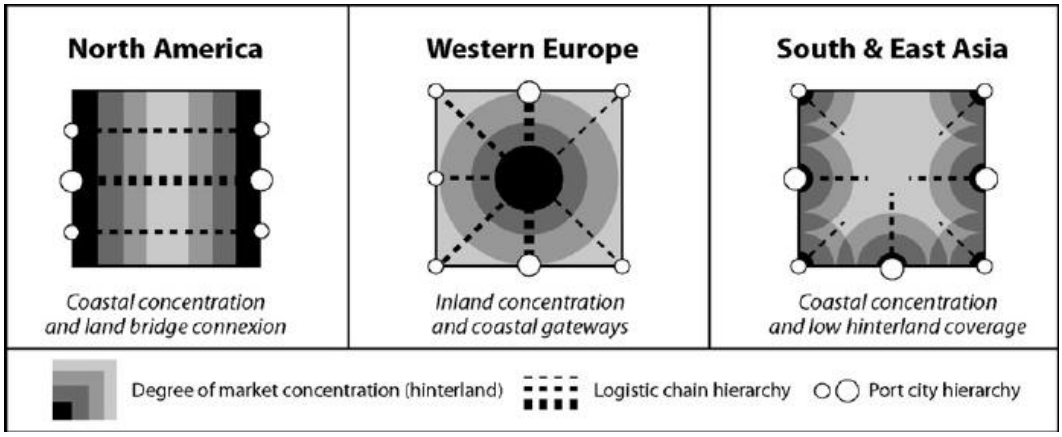


Figure 3.3: Regional patterns of hinterland concentrations

Source: Lee, Song and Ducruet (2008, p.374)

3.7 Corporate social responsibility

Social responsibility should be part of the day-to-day activities of a port, to ensure business sustainability is driven by customer demand and industry competitiveness (Fransen 2013). The social responsibility of an organisation is the accountability for the impacts of its decisions and activities on society and the environment (ISO 2013). The corporate social responsibility (CSR) is defined as the relationship between a corporation and the society in which it resides, in other words the relationship between a corporation and its stakeholders (Crowther & Aras 2008; D'Amato,

Henderson & Florence 2009). CSR is gaining momentum in the evaluation of the relationship between businesses and the region in which they operate (Fransen 2013). The fundamental aspects of CSR are the triple bottom line (3BL) principles: people (social), planet (environmental) and profit (economic). The 3BL principles also appear as dimensions of regional development, as the activities of a port have a significant impact on the social, environmental and economic aspects of its region.

Sustainable development, stakeholders' expectations, international norms of behaviour, integrated organisational practice, and transparent and ethical behaviour are at the root of CSR implementation (ISO 2013). According to ISO 26000, the approach to CSR should be holistic in nature which includes organisational governance, human rights, labour practices, environmental considerations, fair operating practices, consumer issues and community involvement. It is the port authority's role to ensure the responsible performance of port business, and enhancing a port's CSR can be an effective strategy. Though the implementation of CSR is a complex task for ports, as they sit at the centre of the maritime supply chain and deal with both sea and land sides of the industry, it has immense impacts particularly in relation to social and environmental well-being (Fransen 2013). In case of regional ports, it is important to explore the necessity of CSR for an enhanced role in their host regions and regional development.

3.8 Roles of a port

A port is a collection of diverse economic activities (Van Der Lugt & De Langen 2007). Providing services to ships and cargo constitute the basic and traditional role of a port (Bichou 2009). Verhoeven (2010) suggests that ports should be involved in the wider logistics network, providing value-added services, and facilitating other activities in the region including entrepreneurial tasks. The degree of involvement of a port in its region evolves as a result of changes in technology, work practices,

commercial developments and political influences (Pettit & Beresford 2009).

Some of the roles of a port include: a facilitator between trade and transport; an economic catalyst; a link in the supply chain; and a gateway to the port network. The emergence of a port's role in regional development from a geo-dimensional standpoint is also important. Table 3.5 shows a summary of ports' roles based on the literature. A brief description of each type is given below:

3.8.1 The port as a facilitator between trade and transport

A port is a fundamental component in trade and transport (Branch 1986). Transport is a demand driven service directly related to trade. A port supports the efficiency of a transport chain by providing an important link between transport modes (Mangan & Cunningham 2000). The characteristics and importance of this facilitating role become more apparent when a port acts as the focus of diverse trade activities. The convergence of traffic and transport modes is the backbone of value driven supply chains flowing through a port-region.

3.8.2 The port as an economic catalyst

Ports act as an economic catalyst when their activities generate socio-economic benefits for the regions they serve (Bichou 2009). A port supports economic development in the region by attracting new business and increasing trade. Ports participate actively in regional economic policy initiatives For example, Bryan et al. (2006) claim that industries in Wales (UK) are dependent on ports and argue that ports are essential for boosting the local economy. Similarly, policy makers such as the House of Commons Transport Committee (2007) in the UK state that a port should be proactive and should act as a catalyst and strategist in economic development. It supports the perception of a port oriented regional

Table 3.5: A summary of the roles of ports

No.	Roles of Ports	References
	Port as a facilitator between trade and transport	
1	A port supports efficiency of transport chain and facilitates trade	Branch (1986); Mangan and Cunningham (2000)
2	A port is a transport mode changing point in transport chain (1st generation port)	UNCTAD (1992a); Goss (1990c); Pettit and Beresford (2009)
3	A port provides services to ships and their cargoes	Bichou (2009)
	Port as economic catalyst	
4	Port as economic multiplier or development agent	Davis (1983); UNESCAP (2002); UNCTAD (2008); Evans and Hutchins (2002); Bryan et al. (2006)
5	Ports are engine or integral part of local and national economy	Branch (1986); Suykens and Van De Voorde (1998); Bichou (2009);
6	A port is a transport centre for industrial and commercial activities (2nd generation port)	UNCTAD (1992a); Pettit and Beresford (2009)
	A port performs as an economic development catalyst and strategist	House of Commons Transport Committee (2007)
7	A port is a critical conduit for social and economic development of the region	Chen et al. (2012)
	Port as a node in supply chain	
8	A port is an Integrated transport node and logistics centre (3rd generation port)	UNCTAD (1992a)
9	Ports act as links in transport industry, logistic chain and supply chain	Mangan and Cunningham (2000); Bryan et al. (2006)
10	A port performs as a coordinator in supply chain	Carbone and De Martino (2003); Hall and Jacobs (2010)
11	A port is a supply chain integrator with ability to facilitate interconnectivity, inter-modality and information sharing	Paixao and Marlow (2003); Panayides and Song (2009)
12	A port is a node in global supply chain	Notteboom and Rodrigue (2007); Rodrigue, Comotois and Slack (2013)
	Port as a gateway in network system	
13	A port performs as a gateway in a network point / in dynamic logistics chain and diverse supply networks	Van Klink and Van Den Berg (1998); Notteboom (2009)

Table 3.5: A summary of the roles of ports (continued)

No.	Roles of Ports	References
14	A port is a gateway through which goods and passengers are transferred/ a gateway for exporting and importing/ a gateway in intermodal transport networks / a network leader in its region	Suykens and Van De Voorde (1998); Chen, Cahoon and Haugstetter (2010); Rodrigue and Notteboom (2010); Notteboom and Winkelmans (2001)
15	A port is a multi-purpose gateway between sea side and land side networks (4th generation port)	UNCTAD (1999); Paixao and Marlow (2003); Verhoeven (2010)
16	A port is a value enabler in value chain/ an element in a value driven chain systems	Robinson (2002)
17	Supply chain integrator emphasising on standardisation and automation (4th generation port)	Paixao and Marlow (2003)
18	Ports' agile role through standardisation and automation improve ports' integration in network system	Paixao and Marlow (2003); Alderton (2008)
19	A Port is an integrated logistics platform for a systematic relational engagement with its supply chain systems	Almotairi (2012)
	Port's role in regional development	
20	Ports influence on urban formation	Fujita and Mori (1996)
21	Ports contribute to regional development	Haralambides (1997); UNESCAP (2002); UNCTAD (2008);
22	Ports help generate clusters and contribute to economic development through community engagement	De Langen (2004b); Verhoeven (2010)
23	Port as a centre for regionalisation	Notteboom and Rodrigue (2005)
24	Port improves the location offer of a region/ It is a demand creator for regionally produced goods and services	Bryan et al. (2006)
25	Ports influence extending industrial networks in the region	Van der Lugt and De Langen (2007)
26	Ports engagement in non-core, non-maritime business are critical for port and regional sustainability	Bichou (2009); Jung (2011)
27	A Port is a platform for Regional Innovation System (RIS)/ Co-dependency of a port and its region suggests a wider role of port leading to regional development	Chen et al. (2010); Chen, Cahoon and Haugstetter (2010)
28	A proactive role of regional port in its host region through collaboration among the regional organisations and networks	McLaughlin and Fearon (2013); Cahoon, Pateman and Chen (2013); Chen et al. (2012)

economic model where a port acts as an integral part of the economy (Bichou 2009; Ducruet 2009). Australian ports are situated along the coastline making not only an important link between land and sea but also a critical conduit for social and economic development of the region (Chen et al. 2012).

3.8.3 The port as a link in the supply chain

By creating, expanding and maintaining value added activities, transport links in regional areas are critical in developing efficient supply chains (Rodrigue, Comtois & Slack 2013). Panayides and Song (2009) claim that ports are important elements in supply chains because of their ability to facilitate interconnectivity and inter-modality. Numerous intermediary services such as storage, warehousing and value added services including procurement, pre-assembly, packaging, and labelling, take place in the port regions (Carbone & De Martino 2003; Pettit & Beresford 2009). These activities require careful coordination and collaboration within supply chains to achieve a competitive advantage (Hall & Jacobs 2010). Coordinated port-based value added logistics services in distriparks, distribelts, and ICDs strengthen the integration of ports in the supply chain (Pettit & Beresford 2009).

Ports are two-directional logistics systems; they manage cargo from both upstream (that is, from ships to rail, road or inland waterways) and downstream (that is, from hinterland via rail, road or inland waterways to ships). This requires efficient coordination on the part of the port and the port system (Panayides & Song 2009).

Paixao and Marlow (2003) emphasis effective information sharing through information technology, value added services and continuous replenishment and cross-docking activities as requirements of ports in the supply chain. Panayides and Song (2009) regard ports as a focal point in the supply chain because of their ability to facilitate interconnectivity and

inter-modality. The role of ports in the development of a supply chain is pivotal as it can provide communication through interconnectivity and interoperability, reduce operation costs through increased efficiency and help provide timely customer service. This enables port system development to extend beyond the port perimeter and enhances the competitive position of the port in its region.

3.8.4 The port as a gateway to the port network

A port network is an interconnected group of port operators, port users, the port itself and the rest of the economy where the port is located (Bichou 2009). A gateway is an entry point from one network to another (Notteboom 2009). Bichou (2009) defines gateways as 'locations that bring together different modes of transportation along with warehousing, freight forwarding, customs brokering and other logistics services' (p.10).

A port acts as a gateway for several types of network and plays a unifying role in the region (Notteboom & Winkelmans 2001). Goss (1990b) describes ports as gateways through which goods and passengers are transferred. Chen, Cahoon and Haugstetter (2010) consider ports as gateways for exporting and importing in the context of trade. They play a functional role in diverse supply networks (Cahoon 2004; Goss 1990c). Van Klink and Van Den Berg (1998) describe transhipment ports as gateways in intermodal transport networks which forward cargo from one transport network to another.

By providing access to extensive inland logistics, ports play a significant role in the global supply chain (Notteboom & Rodrigue 2007), and in industrial networks (Van Der Lugt & De Langen 2007). Robinson (2002) characterises a port as a value enabler; it delivers value to shippers and third-party service providers whilst achieving value for itself. A port is not only an intersection of two transport networks, the sea and the land, it is a multi-purpose gateway where several transport networks connect

(Verhoeven 2010). A port can be seen as a hub, where cargo arrives from various networks and is distributed for the next leg of its journey. From a political dimension, Pettit and Beresford (2009) describe ports as a vital part of the supply chain with an inherent natural potential for regional development.

3.8.5 The port's role in regional development

The services and activities of ports can generate significant socio-economic benefits in the region (Bichou 2009). The contribution of a port to economic development is well recognised (BTE 2001a, 2001b; Ferrari et al. 2012; Guoqiang, Ning & Wang 2005; Jing & Qing 2009; Merk 2013; Merk & Notteboom 2013; SKM 2010; UNCTAD 2008; UNESCAP 2002; Zhaoliang et al. 2009). The productivity of a port defines its performance which in turn impacts on regional development. A port can promote economic dynamism and investment in a region, become a physical conduit for the transfer of new technology and ideas (Bryan et al. 2006) and be an innovative platform for regional development (Chen, Cahoon & Haugstetter 2010). Through marketing at a regional level, a port may increase tourism, attract foreign investment and create demand for regionally produced goods and services (Bryan et al. 2006).

The relationship between a port and the region suggests a wider role for the port in regional development (Chen et al. 2010). For example, the effective integration of ports in regional economies rather than as indirect facilitators for regional development should be considered (Jung 2011). Chen et al. (2010) illustrate that a regional port could act proactively as a network leader in its region. This can be achieved by nurturing regional innovation and by forming new development channels between the various stakeholders (Cahoon, Pateman & Chen 2013).

Bichou (2009) claims that recent developments in global distribution, logistics, and supply chain systems stimulate change in port management

in four ways: 1) by extending the role of the port; 2) through vertical and horizontal integration strategies; 3) by redefining port hinterland and foreland; and 4) by reassessing the port customer. In regard to the role of a port, Bichou (2009) further states that many ports are now engaged in non-maritime business which contributes to regional development.

Table 3.5 summaries various roles of ports and illustrates broad categories of ports' contribution as discussed above. The first four categories such as a port as a facilitator between trade and transport, an economic catalyst, a node in the supply chain, and a gateway in the network system are well recognised. The port's role in regional development is not well recognised but is an emerging one in the geo-dimensional context (Jung 2011; Verhoeven 2010, 2011). Therefore, the elements accumulated under the broad category of a port's role in regional development will be the focus of the empirical study in this research.

3.9 Roles of the port authority

The role of the port authority is critical for the overall administration of ports. The port authority's role alters to meet the needs of a port in its changing environment (Van Der Lugt & De Langen 2007). In broad terms, a port authority can be a state, municipal, public or private body. It may have responsibility for construction, administration, operation of port facilities, and port security (World Bank 2008a). A national port authority can be responsible for port investment, financial policy, tariff policy, labour policy, licensing, and research, and can act as legal advisor for local port authorities (UNCTAD 1985, 1992a; World Bank 2008a). A local port authority usually plays an administrative and regulatory role on behalf of a municipality or local government (Department of Transport 2011).

The port authority's main tasks are to run the port, to manage infrastructure and to plan and develop port business (Branch 1986). However, port governance has a large influence on the management of

ports and some factors which affect the role of port authorities include the balance of power with government, legal and statutory frameworks, financial viability and management culture (Verhoeven 2010). Of these factors, the balance of power with government appears to have the most impact, as it has a direct impact on the formation of the board of directors, the appointment of top management, the establishment of strategic objectives and port reform processes.

Verhoeven (2010) further argues that it is difficult to avoid political influence and this can deter entrepreneurial activities by the port authority. This can even be a greater concern for regional ports in national context. However, it is also true that the presence of a strong political influence may discourage monopolistic behaviour, overcapacity or wastage of capacity, and biased treatment of port users. The legal and statutory framework of the port authority defines its capacity for commercial, managerial and financial autonomy. Financial viability is a key consideration for any entrepreneurial undertaking by the port authority which facilitates investment in the region. However, the acceptance of government investment in any port infrastructure reduces the autonomy of the port authority.

A market oriented management culture is essential in developing a shared leadership role at a regional level (Bossink 2007; Cruickshank & McGrath 2000; Notteboom & Winkelmans 2001; Sotarauta 2005; Verhoeven 2010). Pressure from powerful players, such as local government and community groups, has influenced the role of the port authority (Dooms & Verbeke 2007; Dooms, Verbeke & Haezendonck 2013; Verhoeven 2010). The efforts of the port authority to balance these pressures and the changing nature of port stakeholders has created a new role for the port authority as a ‘cluster’ manager (De Langen 2004a, 2007) or ‘community’ manager (Verhoeven 2010). The role of the port authority as found in various literatures can be summarised as follows:

3.9.1 Landlord role

The port authority's landlord role shares some characteristics with commercial enterprises, having land as its primary asset (Baird 2000; Van Der Lugt & De Langen 2007). In the role of landlord, the port authority is responsible for the management and development of the port area, port infrastructure and access, land rents and port duties, and safety and environmental issues (Van Der Lugt & De Langen 2007). The management aspect of this role includes real estate management within the port area, economic development, and the maintenance of port infrastructure (World Bank 2008a).

3.9.2 Regulator role

The regulator role of the port authority includes the security of ship and cargo operations and the enforcement of laws and regulations relating to safety, security, environmental protection and labour (Verhoeven 2010). It is an authoritative public role of the port authority (Baltazar & Brooks 2007). The application of rules, regulations, laws, and conventions is the main feature of the regulatory role of the port authority (World Bank 2008a).

3.9.3 Operator role

The operator role of a port authority includes a variety of functions such as cargo handling and passengers transfer, nautical services such as pilotage, towage, and mooring and other services such as waste handling, provision of shore-power for vessels, warehousing and logistics services (Verhoeven 2010). The management and implementation of concession agreements with private port operators and service providers are also part of the operator role (Baltazar & Brooks 2007; Verhoeven 2010).

3.9.4 Community manager

The port authority acts as a community manager in the port cluster situation. A port cluster is a concentration of businesses and activities in the port-region which are interdependent and are therefore motivated to achieve a competitive position with those outside the cluster (De Langen 2004b; Haezendonck 2001). This interdependency requires port authorities to adopt a leadership role in coordination, cooperation and competition. De Langen (2004a) describes this as 'Cluster manager' and Verhoeven (2010) refers to it as 'Community manager'. The community manager role differs from the landlord role and may deal with investments in education, innovation, marketing and hinterland access (Van Der Lugt & De Langen 2007). These types of investments represent regional development initiatives and support the concept of co-dependency between a port and the region (Chen, Cahoon & Haugstetter 2010).

3.9.5 Geo-dimensional role of ports: Regional enabler

An emerging role of the port authority is that of a geo-dimensional in nature which can be stated as a 'regional enabler' role. A port's contribution to regional development involves both maritime and non-maritime clusters beyond the port's perimeter. Besides the port authority, maritime clusters include shipping agents, freight-forwarders, cargo handling companies, shipping companies, ship building and repair, port construction, dredging, fishing, pilotage and other maritime related services; whereas non-maritime clusters include storage of non-maritime cargo, export/import, industry, land transport and other logistics services (Haezendonck, Dooms & Verbeke 2010)

A port-region can encompass both maritime and non-maritime clusters where the role of the port authority goes beyond that of a landlord (De Langen 2008; Lugt, Langen & Hagdorn 2013; Van Der Lugt & De Langen 2007). Comtois and Slack (2007) suggest that the port authority's role may extend to both regional and global markets. Estache and Trujillo (2009)

highlight the expansion of the port authority's role into regional transport agencies. The motivation to extend port authority's role arises from the fact that ports are key competitors in transport and logistics chains (Notteboom & Winkelmans 2001; Pallis, Vitsounis & De Langen 2009; Song 2003; Verhoeven 2010). At a regional level, the port authority can act as an agent to coordinate logistics development, to create regional port networks and to integrate environmental plans in coastal zones. At a global level the port authority can commercialise its coordination of logistics services and environmental management (Comtois & Slack 2007; Hall et al. 2011). Van Der Lugt and De Langen (2007) categorise the port authority's role into 'non-own port activities' and 'own port activities'. They argue that non-own port activities, such as real estate, logistics sites, trade centres and intermodal facilities development can be extended into the hinterland to increase port performance and revenue. The port authority can be regarded as a 'regional enabler', adopting an innovative leadership role in which the port is a strategic platform enabling the region to achieve a competitive advantage. This can be beneficial both for the port's business sustainability and regional development. Verhoeven (2010) views this emerging role from a geo-dimensional perspective. The issue of the port's contribution to society, both in economic and social terms, is becoming increasingly apparent (Van Der Lugt & De Langen 2007) and points to a new role for the port authority in regional development.

Port related planning and policy documents of many countries around the world focus on being consistent with spatial level planning, integration of supply chain, improvement of environmental aspects, and the growth of the port (GHD 2010d). A regional development strategy from a port's perspective should induce innovation, investments particularly from private sector in the concerned region. In addition, it should protect the broad public interest of the region (GHD 2010d). Thus, port strategies can provide a new lens for capturing opportunities regarding innovation, growth, and business sustainability through regional development.

In summary, the port authority's tasks have been significantly reduced because of port privatisation and private sector involvement in port operations and management (Brooks & Cullinane 2007). This may raise doubt about whether the existence of a port authority is necessary (Goss 1990a). However, a port authority is still important for ultimate control and long-term vision. In this context, the reduction of the port authority's operational role can lead to better long-term strategy in relation to the spatial dynamics of the port-region.

3.10 Port strategy

A port strategy is a way of establishing missions and goals, determining how to reach those goals and defining the strategic activities for the port authority (Lugt, Langen & Hagdorn 2013). It is a coordinated unification of actions linking goals and purposes for achieving sustainable outcomes (White 2004). The port authority is pivotal in formulating and implementing port strategy. Consequently, academic research on port authority strategies has evolved as a specific stream of research (Woo et al. 2013). From organisational standpoint, different strategic approaches can be relevant for port such as resource based approach, knowledge based approach and place based approach. These approaches have been discussed from general context in chapter 2 (section 2.5).

Haezendonck (2001) recommends a resource based approach to port strategy. Ports operate in an unstable and competitive market where resource based port strategy can provide an understanding of their competitive position (Coeck 2002; Haezendonck 2001). A resource based port strategy helps ports to evaluate, integrate and configure internal and external resources and capabilities to address changing conditions. Resource allocation and resource creation are fundamental for innovation (Llerena & Matt 2005), while knowledge is the driving force for their effective application.

Allaert (2007) defines a port as a learning centre and cites the knowledge based approach as the optimum port strategy. A knowledge based strategy can also address dynamic environmental challenges around a port (Lee 2010). It can create a sustainable competitive advantage in logistics integration where the port operator is an integral part (Lee & Song 2010). A regional port should develop its own knowledge based innovative strategy.

Place (location) has a significant impact on a port's resource potential and is therefore an important consideration for port strategy. The place based approach to port strategy has not been investigated so far. A port provides a wide range of services, performs multifaceted tasks, faces various problems, serves many customers and interacts with a variety of logistic providers and business entities which create an ever changing and uncertain environment (Coeck 2006). Profit maximisation and market growth are the main objectives of a port (Coeck 2006). In this context, a place based port strategy can link ports' goals and objectives in consistence to the resource potentials of ports' geographical settings to achieve sustainable performance for providing port services in an ever changing and uncertain business environment.

In addition to these, the role of the port authority in port regionalisation and stakeholder management, public-private partnerships, coordination and cooperation, port clusters, and participation in regional innovation are important elements of port strategy. Some of them are discussed below in brief:

1) Port regionalisation

Notteboom (2009) characterises port regionalisation as 'a strong functional interdependency or joint development of a specific load centre and (selected) multimodal logistics platform in its hinterland, ultimately leading to the formation of a regional load centre network' (p.61). Port

regionalisation strengthens the link between maritime and inland freight transport systems (Rodrigue, Comtois & Slack 2009), enhances hinterland sustainability, and improves the competitive position of the port (Notteboom & Rodrigue 2005). However, it can also drive logistics activities away from the port to the port hinterland, consequently decreasing value adding capability and employment prospects in the port (Haezendonck, Dooms & Verbeke 2010). The port authority may take an active role in port regionalisation by developing inland distribution centres, information systems, and inter-modality. This can address port-related challenges such as congestion, increasing port costs, insufficient handling capacity and increased traffic (Notteboom & Rodrigue 2005).

2) Stakeholder management

Stakeholder management helps to achieve the strategic objectives of an organisation by evaluating the external and internal environments of that organisation (Freeman & Freeman 2010; Freeman 1984). It works by identifying and analysing stakeholders using a power/impact matrix which is the subject of periodic update; establishing a communication plan; and by employing experienced managers (Llewellyn 2009). The success of this concept is dependent on the overall context of its application where the proper utilisation of stakeholder management may result in long-term success for an organisation (Aerts, Dooms & Haezendonck 2013).

The adoption of stakeholder management in ports started when ports began to focus on gaining competitive advantage, achieving commercial objectives, ensuring customer demands, and safeguarding their position in global supply chains (Aerts, Dooms & Haezendonck 2013; Brooks & Pallis 2008; Carbone & De Martino 2003; Notteboom & Rodrigue 2005). Port authorities are best placed to evaluate internal and external stakeholders, and to resolve environmental and social conflicts by achieving strategic objectives in a responsible way (Notteboom & Winkelmans 2001; Winkelmans & Notteboom 2007). Due to the developments in industry,

technology and trade, port planning requires consultation with local community and stakeholders as well as experts from different fields such as urban planners, financial and communication specialists, and environmental experts (Moglia & Sanguineri 2003).

3) Public-private partnership

Increasingly, private sector participation in port reform is facilitating port growth and development, by improving port services and arranging funds for further development (UNCTAD 2008; World Bank 2008b). Private sector participation can be regarded as a step towards the privatisation of port activities. It provides flexibility in the port's employment system and work culture and thereby enhances productivity and cost efficiency (Chen 2009). Goss (1990b) introduces four strategies for port authorities in regard to private sector participation in ports. These are: minimalist strategy, pragmatic strategy, public sector strategy and competitive strategy. Goss argues that the extent of the port authority's involvement in port business determines the level of private sector participation and this has an impact on port competitiveness. The landlord port model is an example of how the port authority's minimal involvement can create scope for effective private sector participation.

4) Port authority's international strategies

Dooms et al. (2013) indicate that international strategy is a largely unexplored area of port strategy research. They comment that the port authority's internationalisation strategies can promote the port-region in the international sphere. The port authority's role in protecting both public and private goals in its region motivates it to adopt an international perspective (Dooms et al. 2013). The port authority interacts with multiple international stakeholders, and develops both inward and outward internationalisation strategies as illustrated in Dooms et al.'s (2013) theoretical framework for port authority international strategies. The inward internationalisation includes innovative communication strategies,

infrastructure development involving various international players, concessions, joint ventures and economic incentives such as establishment of Free Trade Zones (FTZs). The outward internationalisation includes commercial representation overseas, transfer of port-specific knowhow and foreign direct investments. Both types of internationalisation strategies have sufficient elements for promoting regional products and innovation, increasing regional competitive advantages and positioning port-region in the international domain. These strategies support regional development where port authorities can act as regional enablers.

5) Coordination and cooperation

Coordination and cooperation are becoming more apparent in port strategy. Cooperation may mean an agreement to specialise in certain services at one port and not duplicating that service at another (Brooks et al. 2009, p.2). Whereas, coordination is the ability for different parties to manage interdependent activities in order to achieve a common goal.

Brooks et al. (2009) state that port congestion and difficult hinterland access are the foremost reasons for the initiation of coordination and cooperation strategies among ports. The coordination of various ports along the supply chain (vertical) and the cooperation among ports (horizontal) appear to be the pattern of cooperation and coordination in strategic port management (Brooks et al. 2009). The port authority is recognised as the central point for this strategic involvement with external (other) port stakeholders (Coeck 2006) and this strategy strengthens the port authority's role as a community manager.

6) Co-opetition

As well as cooperation, competition can be prominent among the same ports. Song (2003) defines this type of situation among ports with the term 'co-opetition', a combination of cooperation and competition. In other

words, co-opetition is an approach of cooperation whilst remaining competitive. Driving forces for co-opetition are globalisation and the formation of shipping alliances; technological improvement such as larger vessels and inter-modality; and the strong port competition that arises because of these factors (Song 2003). According to Song (2003) globalisation integrates markets, intensifies competition in international trade, and increases cargo volume which in turn creates an upsurge in port demand. To cope with this situation, shipping lines rationalise their business in the form of consortia, mergers, and alliances which also increase the negotiating power of shipping lines for favourable port service charges and conditions. Globalisation changes cargo distribution patterns worldwide and is manifested by hub ports, feeder services and inland inter-modal hubs combined with larger ship sizes. As a consequence, some ports have difficulty providing sufficient infrastructure and must cooperate with other ports and facilities. However, some ports excel in business and are able to extend their port management and operation expertise to other parts of the world. A balance between cooperation and competition (co-opetition strategy) ensures competitiveness and commercial interests (UNCTAD 1996) in both cases. This symbiotic relationship provides competitive advantages to all participants and creates a sustainable ground for their business in terms of employment generation and added value, and this indirectly contributes to regional development.

7) Port cluster

A cluster is formed where the attributes of an agglomeration economy is evident (De Langen 2002). The presence of a large labour force, suppliers, customers and knowledge are the attributes of an agglomeration economy (De Langen 2002). Port related economic activities have a significant influence in the regional economy (De Langen 2004b). Haezendonck (2001, p.136) defines a port cluster as ‘a group of interdependent businesses engaged in port related activities, located

within the port-region and with similar strategies leading to a competitive advantage. They are characterised by a joint competitive position regarding the environment outside the cluster'. In other words, ports are regional clusters of maritime and economic activities which have trade and industry involvement in other sectors (De Langen 2007).

The port cluster strategy is primarily policy oriented in nature (De Langen 2004b). It allows better planning for port competitiveness and performance because it takes a holistic view of all factors affecting port and economic activities in the region (Zauner 2008). A strong link between port and city, and the promotion of agglomeration attributes facilitate the success of port clusters. This can directly contribute to a regional economy through production of new services and commodities (Toh, Welsh & Hassall 2010). Therefore, a port's cluster-driven strategy can enhance the role of that port in regional development.

8) Participation in regional innovation

Innovation is the effective introduction of new ideas which results in a competitive advantage (Cedefop 2007). The use of innovation in a region promotes competitiveness and provides the basis for sustainable economic growth in that region (Pekkarinen & Harmaakorpi 2006; Porter 2003). Knowledge creation, dissemination and networking remain at the core of the innovation process where the role of every individual or organisation in the region is significant (Fischer 2001 in Chen, Cahoon & Haugstetter 2010). Innovation may cover a variety of areas such as policies, regulations, technologies, environment and operating practices (Hall, O'Brien & Woudsma 2010).

Having a significant position in its region, a port grows with and contributes to the regional economy (Allaert 2007). An effective port strategy can identify regional potential to convert it into regional development. As a result of the impact of the global supply chain in regional development, the

role of the port is changing (Chen, Cahoon & Haugstetter 2010) from a locational role to a logistical role (Notteboom & Rodrigue 2007). Ports are becoming community managers (Verhoeven 2010) and network leaders and are making a significant impact in regional innovation and development (Chen, Cahoon & Haugstetter 2010). In this context, the port's participation in regional innovation can bring synergy to regional development.

Ports are often located where elements for innovation such as resources and competencies exist, information gathering and dissemination occur, and professional services are delivered (Toh, Welsh & Hassall 2010). Allaert (2007) describes a port as a knowledge centre for the development of innovative maritime clusters where all stakeholders are committed to an integrated long-term port strategy. Allaert (2007) presents a port as an innovative economic organisation where factors for competitive advantages are generated.

The environment is an area where many ports implement their innovative strategy. The provision of ship-shore power, a system to reduce fuel emissions, environmentally friendly truck and locomotive placement, and mandatory ballast water exchange are examples of environmentally responsible port strategies (Hall, O'Brien & Woudsma 2010). A shared understanding among stakeholders along with the port's mediatory role can help to overcome such challenges as restrictive organisational relationships and fragmentation of the supply chain. Hall, O'Brien and Woudsma (2010) further state that too close proximity can destroy innovative ideas, whereas too little proximity may weaken risk-taking and collaborative action. In contrast, institutional proximity that generates trust, motivation for risk-taking and collaboration among key players is essential for innovation and development in regional ports (Hall & Jacobs 2010).

The objective of regional development is to promote the competitiveness of a region (Moulaert & Mehmood 2010) through effective utilisation of local resources (Harmaakorpi 2006). In a similar way, the objective of a port is to ensure the competitiveness of the port business in its region (Rodrigue & Notteboom 2006). Therefore, achieving competitiveness through the use of regional resources is crucial for both regional development and the port's business. As innovation promotes competitiveness, innovation at a regional level, utilising the regional institutional framework, is more likely to result in economic competitiveness (Colletis-Wahl & Pecqueur 2001). The strategic role of a port in regional innovation can also support regional development.

In conclusion, the role of the port in regional development becomes strategic from two perspectives. From a regional development perspective, the contribution of a port to social and economic development is significant, irrespective of whether the port is governed by the public sector or private sector. For public ports, the assessment of this contribution can help to direct port development and becomes instrumental in formulating regional development policy. However, once the port-region becomes well established, the ports are often privatised with the view that the long term future of the region will be better served by treating the port as a business enterprise.

The competitiveness of a port is influenced by its regional setting and it is essential to optimise the benefit of the hinterland for the port's business sustainability (Rodrigue & Notteboom 2006; Wang & Slack 2004). This place induced competitiveness encourages port regionalisation measures (Notteboom & Rodrigue 2005). Hence, the role of a port in its region becomes strategic due to the port's position in regional policy and because of the necessity for port regionalisation. A port can promote port-centric regional development by supporting regional innovation; facilitating private sector participation; enhancing its coordination, collaboration, cooperation

and co-petition role; and by promoting port-cluster based economic development.

3.11 Summary

This chapter framed a definition of regional ports in a national context for this research. It has explained the role of ports in their regions and related issues such as port functions, port governance, and port-city relationship in general context. The role of ports has changed considerably over time, from being a place of refuge for ships and a transport hub, to being a vital link in the supply chain and a facilitator for hinterland development, innovation, community involvement, environment and socio-economic factors. Ports and their regions have developed a more symbiotic relationship where their growth is conditional upon one another. Different aspects of the port-region and their symbiotic relationship have been illustrated.

The port authority plays a critical role in setting the overall role of a port. The role of the port authority's strategy and the roles of ports in their regions are tightly connected. The strategy of a port to contribute to regional development may also vary from port to port because of different geographical attributes. For this reason, active participation in regional innovation, contribution to regional resource configuration, enhancement of port-city relations and different levels of coordination and cooperation among port stakeholders are essential for ports. A port's involvement in regional development is significant because of the co-dependence of the port and the region in which it operates. The role of the port authority as a regional enabler is emerging through increased involvement in regional development which Verhoeven (2010) refers to as the geo-dimensional role of the port authority.

As mentioned earlier, the roles of ports in its region and strategies in a general context explored in this chapter will underpin the empirical study

for regional ports in Australia in this research. Therefore, the next chapter will review the regional development and regional ports in Australia.

CHAPTER 4: REGIONAL DEVELOPMENT AND REGIONAL PORTS IN AUSTRALIA

4.1 Introduction

The previous two chapters discussed the concept of regional development and the roles of a port in its region from general perspectives. This chapter aims to discuss Australian regions and regional development and overview the Australian regional ports (ARPs). As an island nation, the ports and population centres are scattered along the coastline of Australia. Shipping is the backbone of the economy in Australia, and ports are the strategic infrastructure interlinking every aspect of shipping and port-bound land-freight movement. This chapter starts with an introduction to Australian regions and regional development, followed by an overview of the geography, economy and political aspects of Australia and a discussion on Australian regional ports including their locations, cargo handling types, governance and ports' impact on regions. The recent shipping, land freight and port strategies implemented by the Federal Government are also addressed as they will have implications on regional ports' roles in their host regions.

4.2 Geography, economy and political structure of Australia

Australia is an island continent as well as a country with a wide variety of climates ranging from arid to temperate weather, having mostly low plateaux with deserts in the centre and fertile plains in the southeast. It is the driest and smallest continent but the sixth-largest country (7,682,300 sq. km) in the world. Diversity exits not only in climate and geography, but also in culture, population, and history (Australian Government 2014a). Administratively Australia is divided into six states - New South Wales (NSW), Victoria (VIC), Queensland (QLD), South Australia (SA), Western Australia (WA) and Tasmania (TAS), and two territories – Australian

Capital Territory (ACT/Canberra) and Northern Territory (NT) (Australian Government 2014a). As of September 2013, the population of Australia is about 23.23 million. The population of the states and territories are- New South Wales 7.44 million, Victoria 5.77 million, Queensland 4.68 million, South Australia 1.67 million, Western Australia 2.54 million, Tasmania 0.51 million, Northern Territory 0.24 million, Australian Capital Territory 0.38 million (ABS 2014a). Most of the population is concentrated along the coastal region of Australia from Cairns (Queensland) to Adelaide (South Australia), with a small but growing concentration around Perth (Western Australia) (Australian Government 2014a). Figure 4.1 shows Australia's administrative divisions with their population distribution patterns.

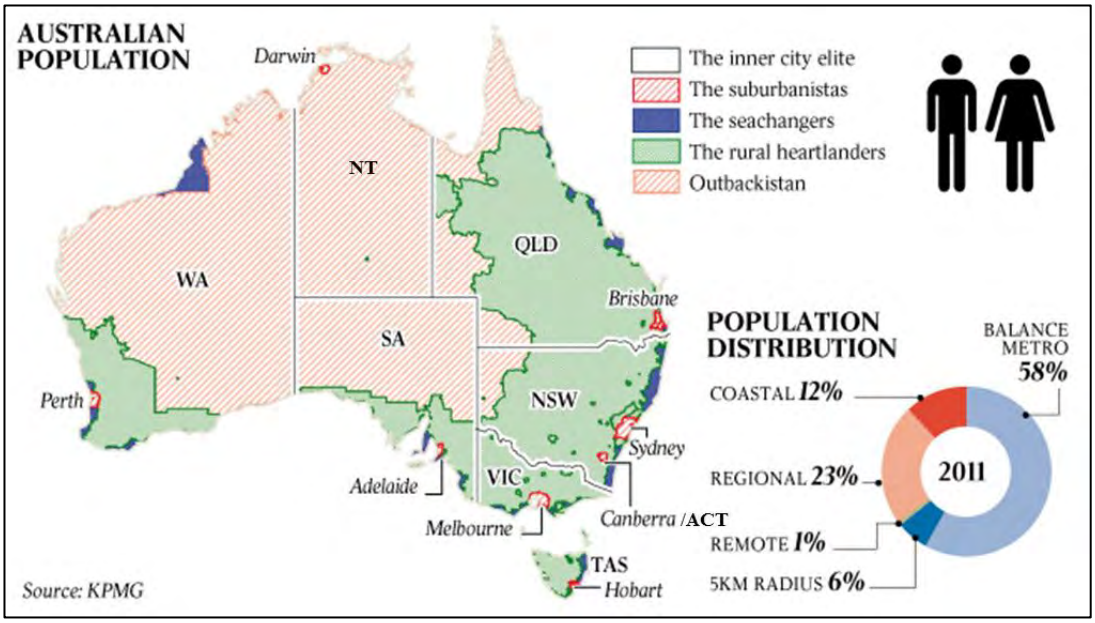


Figure 4.1: States and Territories, and population distribution of Australia

Source: Salt (2012)

Australia has a constitutional monarchy in which the Queen is formally represented by a Governor General. The government system in Australia is a federal parliamentary democracy in a Commonwealth realm. The bicameral National parliament has two chambers: the House of Representatives and the Senate. Each State and Territory has its own Constitutional Act and Parliament and is bound by the National Constitution (ABC 2012; Australian Government 2014a).

Australia has one of the largest capitalist economies in the world with a GDP of US$ 1.57 trillion and a wealth of US$ 6.4 trillion. The economy of Australia is dominated by the service sector. Australia is a fully-employed economy, and the fast growth of the mining industry has created a capacity constraint in terms of labour and capital for the rest of the economy, a phenomenon frequently termed as a two-speed economy. Table 4.1 shows the major industries, exports, and imports of Australia.

About 11.4 million people were employed across these industries in 2010–11 in which the health care and social assistance industries employed 11.4% of total employment followed by retail trade 10.9%, construction 9.1% and manufacturing 8.6% (ABS 2014c).

4.3 Regions and regional development in Australia

The social, economic, and cultural fabric of Australia has a profound impact on regional development activities. Limited success has been achieved in regional development in recent decades in Australia. The rural and remote regions are disadvantaged on many standard indicators of wellbeing, relative to metropolitan cores and that disadvantage tends to increase with remoteness (Beer, Maude & Pritchard 2003; Collits 2002; Coombs 2001; McLachlan, Gilfillan & Gordon 2013). In this context, the fabrics of Australian regions and regional development have been discussed below:

4.3.1 Fabrics of regional Australia

In Australia, regional or region generally indicates areas outside metropolitan or capital cities. Beer, Maude and Pritchard (2003) provide a significant insight on the types of Australian regions, mentioning three

Table 4.1: Major industries, exports, and imports of Australia

Major industries	Major exports in 2012-2013	Major Imports in 2012-2013
➢ Agriculture, forestry and fishing (GVA & GDP $31.38 billion / in 2010-11) ➢ Mining (GVA & GDP $95.51 billion / in 2010-11) ➢ Electricity, gas, water and waste services (GVA & GDP $28.92 billion / in 2010-11) ➢ Manufacturing (GVA & GDP $107.85 billion/ in 2010-11) ➢ Construction (GVA & GDP 101.87 billion/ in 2010-11) ➢ Service industries (GVA $759.73 billion/ in 2010-11) ➢ Tourism (GVA $33.74 billion/ in 2009-10) ➢ Transport, postal and Warehousing (GVA & GDP $67.72 billion/ in 2010-11) ➢ Information, media and telecommunication technology (GVA & GDP $42.37 billion/ in 2010-11) ➢ Research and innovation (Gross Expenditure $28.15 billion/ in 2008-09)	➢ Iron ore & concentrates ($57,082 million) ➢ Coal ($38,640 million) ➢ Gold ($15,301 million) ➢ Education-related travel services ($14,461 million) ➢ Natural gas ($14,271 million) ➢ Personal travel (excl education) services ($12,583 million) ➢ Crude petroleum ($9,719 million) ➢ Wheat ($6,750 million) ➢ Aluminium ores & conc (incl alumina) ($5,565 million) ➢ Copper ores & concentrates ($5,352 million) ➢ Beef ($5,053 million)	➢ Personal travel (excl education) services ($21,990 million) ➢ Crude petroleum ($20,187 million ➢ Passenger motor vehicles ($17,330 million) ➢ Refined petroleum ($16,854 million) ➢ Freight transport services ($9,144 million) ➢ Telecom equipment & parts ($8,916 million) ➢ Medicaments (incl veterinary) ($8,051 million) ➢ Goods vehicles ($7,698 million) ➢ Passenger transport services ($7,151 million) ➢ Computers ($6,650 million) ➢ Technical & other business services ($5586 million)

GVA-Gross Value Added, GDP-Gross Domestic Product

Source: ABS (2014b); Australian Government (2014b)

broad classifications: homogeneous regions, functional regions and administrative regions. The social and economic conditions of the regions are the basic criteria for homogeneous regions classification. The functional regions assign criteria such as labour-market orientation, same water catchment regions, and people's sense of identity and belonging; while the administrative regions are mainly based on administrative boundaries, statistical purpose and planning necessity.

From a socio-economic point of view, Australia is comprised of metropolitan regions, regional cities (inland and coastal), industrial and mining towns, rural areas and remote areas. About 7.7 million square kilometres of the continent is regarded as remote. One third of the population of Australia lives in regional, rural and remote areas and two-third of export income, mainly from mining and resources, comes from these areas (OECD 2011a). The society and economy of Australia can be highlighted in two different strips such as a compact and well-endowed coastal belt, and a vast, under-endowed interior (Maude 2004). The cultural progression of Australia is noted, from bush-culture to suburban-culture to beach-culture and a harmonious existence of each stage exists in the present situation (Maude 2004).

Overall, regional Australia is an overarching demarcation, as oppose to metropolitan areas, includes inland and coastal areas, industrial and mining towns, and rural and remote areas. The different social and economic conditions of the regions, labour-market orientation, administrative and planning necessities are the basic criteria of regional Australia demarcation.

The poor attainments of regional Australia in public service standards, employment opportunities, civic amenities, educational performance, societal opportunities, economic growth and dynamism indicate more attention is required. Achieving competitive advantages and focusing on

export oriented business is an objective of the regional economy of Australia. The disparities within and among the regions in regional Australia need to be addressed (Collits 2004). For the development of regional Australia, competitive businesses, diversified and sustainable industries and generous, welcoming communities are the future requirements (Collits 2004) for which policy enrichment would be effective.

Australia's neo-liberal policy orientation over the past few decades has restricted the central government's activities as macro-level business regulator and fiscal policy manager, and has limited interference in regions (Beer & Kearins 2004). In this context, policy enrichment would be an essential, effective, and continuous task for regional Australia. In Australia, the Federal government has the financial resources and the ability to act nationally. The States and Territories have constitutional powers in most areas of economic development, and local governments have a growing interest in the health of their local economies (Maude 2004, p.16). This situation may also have a significant impact on configuring regional governance in Australia. Meaningful structural and organisational reforms (Liou 2000b), trade-offs between social and economic benefits of development are crucial to foster economic cooperation between state and local governments.

4.3.2 Regional development in Australia

Although, the retention of the competitiveness of Australia in the global knowledge economy, by regional development, is emphasised in the national economic framework (Maude 2004), regional development in Australia is affected by the federal government's partisan politics for regional policy, the various State governments' limited resource capabilities and local governments' continually weak fund situation and weak constitutional position (Collits 2004). This, combined with the regional variation and geographic orientation of Australia, suggests practising a new regionalism approach. The approach which favours the

role of institutional dynamics and learning region concepts and beyond that, to a strategic coupling among transport networks, including regional ports and regional assets, which can be supportive for regional development.

Regional development in Australia is mainly influenced by the factors such as production and efficiency, productivity growth, export and domestic demand, as well as supply side factors such as labour, capital and increasingly water (Coombs 2001). Critical events and triggers, such as drought or a free trade agreement, the life cycles of the main products and technologies as well as available natural endowments, also have an impact (Coombs 2001). As a big nation, the factors of regional development and the strengths and constraints in Australia vary from region to region.

The lack of medium-size towns, faint economic decentralising forces, and poor transport and communication infrastructure hinder regional development in Australia (Maude 2004). Basic infrastructure, particularly in rural and remote areas, is largely subsidised and provided by local government agencies (Sorensen, Marshall & Dollery 2007). Water and accessibility are crucial for in-migration and population growth in regional Australia, both of which are necessary to create domestic markets (Maude 2004). Job creation and attraction of in-migration in regions also depends on the proximity of markets, diversity of industries, including the presence of service industries, and service provisions in regional Australia. Collits (2004) argues that competitive businesses, sustainable industries and open, welcoming communities are the primary requirements for future regional Australia.

In the abovementioned circumstances, increasing political attention, decentralising governance, growing stakeholders' participation and a bottom-up approach are noticeable trends in Australian regional

development efforts. This will gradually lead toward development governance, via cross-sectoral partnerships involving the public and private sectors (Eversole & Martin 2005).

In regional Australia, strong local networks and supply chains exist in the automotive, printing and publishing and textiles clusters (Roberts & Enright 2004). However, the research in the field of industry clusters did not gain momentum. Roberts and Enright (2004) support the importance of the development of industry clusters in Australia. With the exception of the natural resource sector where competitive advantage still exists, Australian industry clusters have a weak base due to the lack of established infrastructure (Roberts & Enright 2004).

Building infrastructure in the region relies on mutual trust and respect. Partnerships between industry stakeholders and governments are the basis of successful industry clusters (Roberts & Enright 2004). The performance of clusters developed through restructuring old regional industries has proven to be successful. Examples can be found in the Australian wine, finance and tourism industries. Transportation and logistics corridors are crucial for regional industry clusters (Roberts & Enright 2004), where regional ports can be the focal point. Regional ports in Australia which are heavily engaged in export can be the in-house platform for Australian industries' international networking efforts and can perform as strategic infrastructure for the industry clusters.

A large number of sectors contribute to the Gross Domestic Product (GDP) of Australia in various ranges. Commodity production, tourism, traditional export industries like mineral exports and primary production (agriculture), are the most important elements of the Australian economy (Beer, Maude & Pritchard 2003). The agricultural sector's contribution to GDP is in a low range, while the manufacturing sectors which mainly focus on small and medium technology industries also contribute to GDP in a

lower range. This is largely due to a lack of investment in research and development (R&D) or innovation (Maude 2004). Opportunities for higher incomes and skills generation are hindered by the dependency on the importation of high and medium technology-intensive manufactured products. The mining and resources sector is the backbone of the Australian economy, but very much dependent on Chinese demand. This demand is volatile and shrinking day-by-day.

Although agriculture has been regarded as a stronghold of the Australian economy, it has also created difficulties in many non-metropolitan economies (Beer & Kearins 2004). The reasons may include too great a dependence on agriculture and a failure to improve other sectors. The regions have not upgraded or diversified their economic base, through establishing industries or developing their potential. Some exceptions do exist, as mentioned in Beer (2004), farmers in South Australia are now exporting frozen dough products instead of wheat to the Japanese market. This is an innovative instance of product differentiation to gain competitive advantage. Regional ports therefore could gain an advantage by providing storage facilities to help this industry and capture a part of the business.

In an another example from Beer and Kearins (2004), the city of Onkaparinga started the Regional Export Extension Service (REES) in the late 1990s, which brought positive changes in export in the regional businesses, through increased networking and learning opportunities. Regional ports, in a joint effort with local government, could be involved in these types of venture, so that production in the region and export through these ports are increased.

Collits (2004) identifies that regional policy in Australia is frequently framed on a post hoc basis. National policies and reform agendas are generally formulated in ways which impact on diverse rural and regional issues (Maude 2004). Regional Australia requires forward planning rather than a

reactive response to problems in the regions. Government should always have a role in regional development but not in an interventionist way, rather as an enthusiastic partner. A partner-leadership approach needs to be developed among the government and the community as both have their interests, capabilities and deficiencies.

In Australia, regional development activities are not well coordinated, as there are several organisations at various levels with different and sometimes overlapping functions. The regional development framework in Australia is based on the three tiers of government and their relationship is dictated by their constitutional and financial arrangements (OECD 2011a). The governance structure consists of the Council of Australian Government (COAG), the Australian Council of Local Government (ACLG), the Federal Department of Infrastructure, Transport, Regional Development and Local Government and Infrastructure Australia. Regional Development Australia (RDA), a federal government initiative, has 55 committees Australia wide, which bring together all levels of government for regional development (RDA 2013). The RDA strategically reduces the distances among different levels of government. Specific budget is not provided for regional development rather the Federal and State governments run some mainstream and region-specific programmes that convey regional development outcomes.

In regional development efforts a balancing characteristics in coordinating and satisfying all authorities and entities is important. For example, Everett and Robinson (2013) raise this complex scenario as a constitutional and jurisdictional barrier for effective implementation of the National Port Strategy, which involves many stakeholders with varying interests. The efficient coordination of different interest groups and various levels of government, and a balanced public–private partnership can bring stability, continuity and certainty for regional development. To overcome these barriers, Maude (2004) emphasises an endogenous development

approach and involvement of the private sector when implementing regional development activities.

The Australia's Local and Regional Development (L&RED) agencies are less concerned with satisfying the needs of industry sectors (Beer & Kearins 2004). They are also less focused on strategies and activities which promote cluster development, supply chain associations, business incubators, and mentoring programs. In this vacuum, local and regional businesses, infrastructure and services need to adopt innovative strategies relating to regions and development to ensure their sustainability. To combat regional inequalities, it is essential to foster innovative strategies among various regional organisations and infrastructures such as regional ports. These innovative strategies will support regional development beyond existing federal and state efforts. Infrastructure is the basic requirement which simultaneously follows and fosters regional development should be provided and strategized in an integrated way leading to regional development. Community engagement, stakeholder participation, public-private partnerships, social capital and innovation are critical strategic elements that need to address through infrastructure strategy.

Beer, Maude and Pritchard (2003) argue that services mostly have linkages at the regional level. Production linkages are typically global in nature and industry linkages are usually spread nationally and internationally. The effective utilisation of existing infrastructure and transport linkages is the general principle and requirement of sustainable development (Gaffikin & Morrissey 2001). Since most ports in Australia are situated at the regional level, the strategic deployment of these regional ports will certainly have a positive impact in sustainable regional development. The services of regional ports in Australia link industries, productions and markets, in other words, supply and demand of the market. This ultimately promotes regional specifications and products, a

significant element for gaining competitive advantages, which in turn contributes to the regional development. In this context, the Australian regional ports are discussed next.

4.4 An overview of Australian regional ports

In Australia, ports play a crucial role for trade and regional development. The distribution and locations of Australian ports tentatively draw a geographic borderline of Australia (see Figure 4.2) and indicate the potential of ports as a connector between sea and land transportation for international and regional trade. According to Ports Australia, there are 70 Australian ports, out of which 65 are considered as regional ports and remaining five are metropolitan ports (Anderson 2011). The five metropolitan ports include Sydney port, Brisbane port, Fremantle port, Adelaide port and Melbourne port and are frequently mentioned as capital city ports. As defined in general context in chapter 3 (section 3.3), the 65 Australian regional ports (ARPs) are the ports outside metropolitan cities serving regional businesses.

A wide range of cargoes is handled by Australian ports but individually most ports handle a smaller variation of cargoes with some only dealing with one or two commodities. The analysis of Ports Australia (2013b) providing cargo handling statistics (2008-2012) depicts that Australian regional ports mainly handle bulk export cargo and general cargo, while metropolitan ports mainly handle containerised cargo and some bulk and general cargo (Table 4.2).

Figure 4.2: Australian ports at a glance

Source: Ports Australia (2013b)

Table 4.3 shows the data on cargo volumes handled by Australian regional ports (ARPs) and Metropolitan ports (MPs) between the year 2000-2001 and 2011-2012. In general, the total cargo handled has increased each year over the period. Both ARPs and MPs performed with an annual growth over the period except 2008 when MPs decreased. In 2011-2012, the total cargo handled by Australian ports was about 103 million mass tonnes, of which 86.5% was export cargo and 13.5% import cargo. MPs handled about 14.2% of the total cargo while ARPs performed 85.8%. In terms of export cargo, MPs handled only 7.5% of the total export task while ARPs performed 92.5%.

Table 4.2: Types of cargo handled by Australian ports

Item (unit)	2007-2008		2008-2009		2009-2010		2010-2011		2011-2012	
	ARPs	MPs	ARPs	MPs	ARPs	MPs	ARPs	MPs	ARPs	MPs
General cargo (in thousand mass tonnes)	11,189	57,595	14,645	49,851	15,883	5,1286	29,252	54,444	26,202	63,789
Bulk Cargo (in thousand mass tonnes)	660,185	69,000	675,180	69,156	779,564	70,297	784,582	73,827	861,138	83,250
Containerised Trade (in thousand mass tonnes)	4,890	53,993	4,711	51,332	4,617	52,589	5,488	55,680	5,047	58,710
Containerised trade (in thousand TEU)	475	5,838	432	5,670	414	5,915	501	6,288	458	6,602

Source: Ports Australia (2013b)

ARP→ Australian regional ports
MP→ Metropolitan ports

Table 4.3: Total throughput of Australian Regional Ports (ARPs) and Metropolitan ports (MCPs)

(In mass thousand tonnes)

Year	Import			Export			Overall (Export + Import)		
	Import total (% of Grand total)	ARPs (% of Import total)	MPs (% of Import total)	Export total (% of Grand total)	ARPs (% of Export total)	MPs (% of Export total)	Grand total	ARPs total (% of Grand total)	MPs total (% of Grand total)
2011-12	139,197 (13.5)	59,638 (42.8)	79,558 (57.2)	895,209 (86.5)	827,729 (92.5)	67,480 (7.5)	1034,406	887,366 (85.8)	147039 (14.2)
2010-11	134,040 (14.2)	60,617 (45.2)	73,423 (54.8)	808,065 (85.8)	753,218 (93.2)	54,848 (6.8)	942,105	813,834 (86.4)	128271 (13.6)
2009-10	126,061 (13.7)	55,797 (44.3)	70,264 (55.7)	790,969 (86.3)	739,650 (93.5)	51,319 (6.5)	917,030	795,447 (86.7)	121583078 (13.3)
2008-09	123,032 (15.2)	53,894 (43.8)	69,138 (56.2)	685,800 (84.8)	635,931 (92.7)	49,869 (7.3)	808,831	689,825 (85.3)	119006757 (14.7)
2007-08	133,278 (16.7)	56,805 (42.6)	76,473 (57.4)	664,691 (83.3)	614,570 (92.5)	50,122 (7.5)	797,969	671,374 (84.1)	126594650 (15.9)
2006-07	127,302 (16.9)	55,095 (43.3)	72,207 (56.7)	626,519 (83.1)	578,251 (92.3)	48,268 (7.7)	753,821	633,346 (84.0)	120474778 (16.0)
2005-06	122,767 (17.6)	53,798 (43.8)	68,969 (56.2)	574,681 (82.4)	528,235 (91.9)	46,446 (8.1)	697,448	582,033 (83.5)	115414767 (16.5)
2004-05	121,112 (17.4)	53,237 (44.0)	67,875 (56.0)	576,029 (82.6)	528,291 (91.7)	47,739 (8.3)	697,141	581,528 (83.4)	115613573 (16.6)
2003-04	116,074 (18.4)	49,950 (43.0)	66,124 (57.0)	516,215 (81.6)	470,196 (91.1)	46,018 (8.9)	632,289	520,146 (82.3)	112142383 (17.7)
2002-03	109,412 (17.8)	48,284 (44.1)	61,128 (55.9)	506,958 (82.2)	463,921 (91.5)	43,037 (8.5)	616,370	512,205 (83.1)	104165252 (16.9)
2001-02	104,461 (17.7)	47,733 (45.7)	56,728 (54.3)	486,043 (82.3)	440,729 (90.7)	45,313 (9.3)	590,504	488,463 (82.7)	102040897 (17.3)
2000-01	103,089 (17.9)	47,228 (45.8)	55,861 (54.2)	474,411 (82.1)	430,060 (90.7)	44,351 (9.3)	577,500	477,288 (82.6)	100212 (17.4)

ARP→ Australian regional ports, MP→ Metropolitan ports

Source: Ports Australia (2013b)

On the other side, MPs perform more than half (57.2%) of the total import task while ARPs handled 42.8%. These figures show the importance of regional ports in Australia's trade and economy, in particular export.

Apart from those five metropolitan ports mainly handling containerised cargo, regional ports in each state handle bulk and general cargo. Table 4.4 shows the cargo types handled by ports in each state and Tables B-1 and B-2 in Appendix B further provide detailed export commodities handled by state-wide ports and the throughput of major Australian ports respectively.

In summary, Western Australian (WA) ports mainly handle bulk commodities such as iron ore, grain and oil and petroleum and general cargo such as livestock. South Australian ports handle bulk commodities in particular grain and general cargo such as motor vehicle, livestock and wool. In Queensland, major bulk commodities handled include coal, sugar and oil and petroleum, and general cargo commodities handled include livestock, motor vehicle, cotton and wool. In New South Wales, main bulk commodities handled are grain, coal and sugar and main general cargo handled includes timber and steel. Victorian ports handle bulk cargo such as grain and general cargo such as steel, timber and livestock. Port of Darwin is the major port in Northern Territory and mainly handles liquid bulk oil and petroleum and general cargo such as livestock. In Tasmania, timber, copper, aluminium, livestock and container are the main commodities handled by ports.

As export and import are equally important for the economic growth of a country in this globalised world, the role of export oriented regional ports and import oriented metropolitan ports in Australia indicate a complementary nature for overall economic growth of the country. This may reveal that the sustainability of both regional ports and metropolitan ports are partially dependant on each other.

Table 4.4: Types of cargo handled by state-wide ports

Name of States	Cargo type		
	General cargo	**Bulk cargo**	**Containerised cargo**
WA	● Broome ●Bunbury ●Dampier ● Esperance ● Fremantle ● Geraldton ● Port Hedland	● Albany ● Broome ● Bunbury ● Dampier ● Esperance ● Fremantle ● Geraldton ● Port Hedland	● Broome ● Esperance ● Fremantle ● Port Hedland
SA	● Adelaide ● Port Pirie	● Klein Point ● Adelaide ● Port Giles ● Port Lincoln ● Port Pirie ● Thevenard ● Wallaroo	● Adelaide
VIC	● Geelong ● Melbourne ● Hastings ● Portland	● Geelong ● Melbourne ● Hastings ● Portland	● Melbourne
NSW	● Eden ● Newcastle ● Kembla ● Sydney ● Yamba	● Eden ● Newcastle ● Port Kembla ● Sydney	● Eden ● Newcastle ● Kembla ● Sydney
QL	● Cairns ● Gladstone ● Port Alma (Rockhampton) ● Karumba ● Lucinda ● Mackay ● Mourilyan ● Brisbane ● Quintell Beach ● Thursday Island ● Townsville ● Weipa	● Abbot Point ● Cairns ● Cape Flattery ● Gladstone ● Port Alma (Rockhampton) ● Hay Point ● Karumba ● Lucinda ● Mackay ● Mourilyan ● Brisbane ● Bundaberg ● Thursday Island ● Townville ● Weipa	● Cairns ● Gladstone ● Port Alma (Rockhampton) ● Brisbane ● Thursday Island ● Townsville
NT	● Darwin	● Darwin	● Darwin
TAS	● Bell Bay ● Burnie ● Devonport ● Hobart	● Bell Bay ● Burnie ● Devonport ● Hobart	● Bell Bay ● Burnie ● Devonport

Source: Ports Australia (2013b)

Additionally, the five metropolitan ports of Australia are congested and have less opportunity for expansion because of the land scarcity and the proximity to the city. The services of regional ports particularly the bulk regional ports can supplement and support the services of metropolitan ports (Asciano 2010).

4.5 Port governance in Australia

The majority of Australian ports are owned by state governments but with a few are privately owned, generally bulk ports. Port authorities are accountable for managing ports while the private sector mainly operates cargo handling and other business activities at ports. In 1990s, the government promoted commercialisation policy to improve efficiency of port authorities, therefore the continuing reform of corporate structure and ownership of Australian ports has been undertaken since then (Chen & Everett 2013). The consequence of the reform was of difference among states as ports are under state jurisdiction rather than the Commonwealth Government. In general, except few regional ports were privatised, corporatisation model has been widely adopted by state governments for restructuring port authorities. Everett (2009) identifies two types of corporatization models exist in Australian ports. One is the Government-Owned Company (GOC) registered to the Australian Securities and Investment Commission (ASIC), where the Minister represents the ownership of the port and remains liable to the Corporation Act, hereby accountable to the Australian Securities and Investment Commission (ASIC). The other is the Statutory State-Owned Corporation (SSOC), the preferred option in most states, subject to the organisation's specific statute with the Minister holding the supreme authority and remains accountable to the Parliament.

In Australian corporatisation models, government control remains persistent with most commercial activities given to private sector. This creates a hybrid port environment, whereas commercialisation strategy is

utilised as the precursor for corporatisation. In both corporatisation models, sometimes government or political influences and interests may not match with commercial objectives. It is noted that some states, such as South Australia and Queensland, have adopted a SSOC model when first corporatising its ports and subsequently introduced further reform enacting ports as GOCs which became precursor to privatisation occurred in 2001 and 2010 respectively (Chen & Everett 2013). It seems that port corporatisation in Australia has become a precursor to privatisation, which was not the case in the past (Chen & Everett 2013). The recent privatisation of Sydney's Port Botany and Port of Kembla in May 2013 is an evidence of it.

The above context shows that the governance of Australian regional ports has influence in shaping their roles in regions and regional development. The following sections detail the state-wise orientation of Australian regional and metropolitan ports' governance.

4.5.1 Ports in New South Wales

Table 4.5 shows the ports of New South Wales, including their types, ownership and management. The Port of Newcastle and Port Kembla are regional ports, whereas the Ports of Sydney (Sydney Harbour and Port Botany) is a metropolitan port. Two small regional ports such as the Port of Yamba and Port of Eden, used to be managed by the state agency NSW Maritime, are managed by Sydney Ports Corporation after the restructuring of the state's transport authorities in 2011 (NSW Auditor-General 2011; Sydney Ports 2013b). The ports regulatory framework in NSW supports equilibrium between promotion of competition and viable port operations which require collaborative working relationships with port stakeholders including port services supply chain members (New South Wales Government 2007).

Prior to 2013, the Ports of Sydney, Port of Newcastle and Port Kembla in NSW are State owned and managed by statutory State owned port corporations, Sydney Ports Corporation, Newcastle Port Corporation and Port Kembla Port Corporation respectively, under the Ports and Maritime Administration Act, 1995 (Everett 2009). These ports follow commercial objectives (New South Wales Government 2007). In addition, they also have wider objectives including trade facilitation, growth for the region and to serve social and community interests (New South Wales Government 1995).

Table 4.5: Major ports of New South Wales (NSW)

Port name	Types of port	Ownership	Port management
Ports of Sydney • Sydney Harbour • Port Botany	Metropolitan port	State owned Private	Sydney Ports Corporation NSW Ports
Port of Kembla	Regional port	Private	NSW Ports
Port of Newcastle	Regional port	State owned	Newcastle Port Corporation
Yamba	Regional port	State owned	Sydney Ports Corporation
Eden	Regional port	State owned	Sydney Ports Corporation
Small local port: Lord Howe Island			

Sources: Ports Australia (2013b); Sydney Ports (2013b)

In May 2013, Port Botany of the Ports of Sydney and Port Kembla were privatised with a 99-year lease to the private sector, NSW Ports. The Port of Newcastle is also in the same process of privatisation. This leasing initiative termed as ‘recycling of infrastructure assets’ is intended to increase public-private partnerships and unlock funds for essential freight logistics infrastructure to improve supply chain efficiency (Australia 2013; Hailey 2011; Sheppard 2013; Storey 2013). After the privatisation of Port Botany, the NSW Government, through Sydney Ports Corporation, retains regulatory oversight of the Port of Botany, and Sydney Ports Corporation retains a significant maritime role including that of Harbour Master,

Pilotage, maintenance of navigation buoys and markers and the Port Jackson wharves and cruise shipping functions (Sydney Ports 2013a).

4.5.2 Ports in Victoria

The major ports in Victoria are Melbourne, Hastings, Geelong and Portland. Ports of Melbourne and Hastings are State Owned ports, while Geelong and Portland ports are privatised ports (State Government of Victoria 2012). Hastings, Geelong, and Portland ports are regional ports, whereas Port of Melbourne is a metropolitan port. The Russell Review in 2000 on Victorian ports privatisation and corporatisation stimulated the revision of the *Port Services Act 1995* in 2003 and the publication of Victorian Ports Strategic Framework (VPSF) in 2004 (State of Victoria 2009). This has had significant influence on the competition among Victorian ports. The amended port legislation requires port corporations to ensure competition is included within port services provisions, such as in providing stevedoring services (State of Victoria 2009). However, the active participation of port corporations in external systems, network development and management are not specified in the objectives and functions of port corporations. Nevertheless, the VPSF and present policy supports the role of Portland, Geelong and Hastings ports for dry, liquid, and break-bulk cargoes, while international containers are set aside for Melbourne port until it reaches capacity. After which, Port Hastings will start container handling as Victoria's second container port (State of Victoria 2009). Victoria is largely dependent on its regional ports for the export of minerals, bulk products and agricultural commodities (State of Victoria 2009b). Table 4.6 shows the list of ports in Victoria.

Table 4.6: Ports of Victoria

Port name	Types of port	Ownership	Port management
Port of Melbourne	Metropolitan port	State owned	Melbourne Port Corporation
Port of Hastings	Regional port	State owned	Port of Hastings Development Authority;
Geelong Port	Regional port	Private	Patrick Ports
Port of Portland	Regional port	Private	Port of Portland Pty ltd

Source: Ports Australia (2013b)

In addition to these ports, the State of Victoria owns fourteen other very small local ports which are managed by the Department of Sustainability and Environment (DSE). These smaller ports continue to make substantial economic and social contributions to the State and national economy and communities. They continue to provide significant services to the commercial and recreational fishing, tourism and boating services (SKM 2010).

4.5.3 Ports in Queensland

The ports of Queensland are operated by four government-owned port authorities and one private port authority under the provision of the *Government Owned Corporations Act 1993*, the *Transport Infrastructure Act 1994* and the *Financial Administration and Audit Act 1977* (The State of Queensland 2012). The port authorities are Far North Queensland Ports Corporation Limited (FNQPC), known as 'Ports North', Port of Townsville Limited, North Queensland Bulk Ports Corporation Limited (NQBP), Gladstone Ports Corporation Limited and Port of Brisbane Pty Ltd. Table 4.7 shows the list of ports in Queensland.

In 2010, the Port of Brisbane Pty Ltd has been leased under a 99-year lease contract to Q Port Holdings, a consortium of four world's largest and most experienced infrastructure investors. The members of the consortium are Global Infrastructure Partners, Industry Funds Management, QIC Global Infrastructure and Tawreed Investments Ltd, a wholly-owned subsidiary of the Abu Dhabi Investment Authority.

The State-based economic regulation framework shapes the business activities of Queensland port authorities. The shareholding ministers also intervene and override Board's decisions if any anti-competition situation occurs (The State of Queensland 2008). This ensures competition neutrality by overseeing monopoly price and third party access issues.

Table 4.7: Ports of Queensland

Port name	Types of port	Ownership	Port management
Port of Brisbane	Metropolitan port	Private	Port of Brisbane Pty Ltd (PBPL)
• Cairns Port • Mourilyan • Karumba • Thursday Island • Cape Flattery • Skardon River • Quintell Beach • Burketown • Cooktown	Regional port	State owned	Far North Queensland Ports Corporation Limited (Ports North)
Port of Townsville	Regional port	State owned	Port of Townsville Limited
Lucinda Port	Regional port	State owned	Port of Townsville Limited
• Port of Weipa • Abbott Point • Port of Mackay • Hay Point and Dalrymple Bay	Regional port	State owned	North Queensland Bulk Ports (NQBP)
Port of Gladstone	Regional port	State owned	Gladstone Ports Corporation
• Port Alma (Rockhampton) • Bundaberg Port	Regional port	State owned	Gladstone Ports Corporation

Source: Ports Australia (2013b)

The present corporatisation structure of Queensland ports stimulates commercial approach while government ownership ensures ports take a broader focus for the economic growth of the regions (Everett 2009; The State of Queensland 2008).

4.5.4 Ports in South Australia

In South Australia, port corporatisation was the precursor to privatisation (Everett 2009) and now most of the ports are privatised. Table 4.8 presents a list of South Australia ports including the Port of Adelaide which is a metropolitan port. The private operator 'Flinders Ports' operates the Port of Adelaide and six regional ports namely Port Lincoln, Port Pirie, Port

Giles, Klein Point, Thevenard and Wallaroo under a 99-year lease and operating license (Everett 2009; Government of South Australia 2008). There are other seven small regional ports in South Australia managed by the Department for planning, transport, and infrastructure.

Table 4.8: Ports of South Australia

Port name	Types of port	Ownership	Port management
Port of Adelaide	Metropolitan port	Private	Flinders Ports
• Port Lincoln • Port Pirie • Port Giles • Klein Point • Thevenard • Wallaroo	Regional port	Private	Flinders Ports
Port Stanvac	Regional port	Private	Mobil Refining Australia Pty. Ltd.
Cape Jervis	Regional port	State owned	Department for Planning, Transport and Infrastructure, SA
Penneshaw	Regional port	State owned	Department for Planning, Transport and Infrastructure, SA
Kingscote	Regional port	State owned	Department for Planning, Transport and Infrastructure, SA
Ardrossan	Regional port	State owned	Department for Planning, Transport and Infrastructure, SA
Port Bonython	Regional port	State owned	Department for Planning, Transport and Infrastructure, SA
Whyalla	Regional port	State owned	Department for Planning, Transport and Infrastructure, SA

Source: Ports Australia (2013b)

A competitive environment for port related services for exporters and importers has been provided through South Australian legislation (Government of South Australia 2008). It encompasses port privatisation, development, and competition. This legislation includes S*outh Australian Ports (Disposal of Maritime Assets) Act 2000, South Australian Ports (Disposal of Maritime Assets) (Miscellaneous) Amendment Act 2007*, *Maritime Services (Access) Act 2000*, and *Development Act 1993.*

Within South Australia, a single private operator is employed for all major ports (Everett 2009). This may hinder inter-port competition, however there is provision for cross-ownership through the legislation. This is intended to promote inter-port competition by limiting ownership concentration for the operator. In addition, it provides the authorising stakeholder minister to provide an asset divest order to the operator in any scenario that is against the interest of the state and anti-competitive in nature (Government of South Australia 2008).

4.5.5 Ports in Western Australia

In Western Australia (WA), there are 20 ports (Government of Western Australia 2012) where a commercialisation strategy were adopted initially to govern these ports and later the WA government corporatised the major ports through passing the *Port Authorities Act 1999* (Everett 2009). Two types of governance structures exist for Western Australian ports. One is port authority ports, which are governed by the *Port Authorities Act 1999.* This includes a metropolitan port and seven main regional ports of WA. While the second governance structure, is a non-port authority ports, which is governed by the *Shipping and Pilotage Act 1967* and the *Marine and Harbours Act 1981*. These are controlled by the Department of Transport including twelve small private operator ports with minimum government involvement (Government of Western Australia 2011a). Table 4.9 shows the ports of Western Australia.

The Fremantle port is a metropolitan port in WA and engaged in handling a high volume of import commodities, whereas seven regional ports, Esperance, Albany, Bunbury, Geraldton, Dampier, Broome, and Port Hedland, largely handle bulk export commodities. Among these regional ports, Dampier has privately owned extensive export facilities (Government of Western Australia 2011a). The twelve regional ports, categorised as ‘proclaimed ports’ under the *Shipping and Pilotage Act 1967* (Government of Western Australia 2011b, 2012), are managed by

the Department of Transport and generally operated by the single user private sector with their own facilities. The challenge with government owned WA regional port authorities is that they have trade facilitation roles.

Table 4.9: Ports of Western Australia

Port name	Types of port	Ownership	Port management
Fremantle Ports	Metropolitan port	State owned	Fremantle Ports
Albany Port	Regional port	State owned	Albany Port Authority
Broome Port	Regional port	State owned	Broome Port Authority
Bunbury Port	Regional port	State owned	Bunbury Port Authority
Dampier Port	Regional port	State owned	Dampier Port Authority
Esperance Ports	Regional port	State owned	Esperance Ports
Geraldton Port	Regional port	State owned	Geraldton Port Authority
Port Hedland Port	Regional port	State owned	Port Hedland Port Authority
Wyndham	Regional port (proclaimed port)	State owned	Department of Transport, WA
Cockatoo Island and Koolan Island (known as Yampi Sound)	Regional port (proclaimed port)	State owned	Department of Transport, WA
Derby	Regional port (proclaimed port)	State owned	Department of Transport, WA
Port Walcott (Cape Lambert)	Regional port (proclaimed port)	State owned	Department of Transport, WA
Port Preston (under construction)	Regional port (proclaimed port)	State owned	Department of Transport, WA
Varanus Island	Regional port (proclaimed port)	State owned	Department of Transport, WA
Barrow Island	Regional port (proclaimed port)	State owned	Department of Transport, WA
Airlie Island, Thevenard Island and Onslow (known as Onslow)	Regional port (proclaimed port)	State owned	Department of Transport, WA
Cape Cuvier and Useless Loop (Carnavon)	Regional port (proclaimed port)	State owned	Department of Transport, WA

Information source: Government of Western Australia (2011b); Ports Australia (2013b)

However, the *Port Authority Act 1999* emphasises on profit making commercial endeavours, which reveals a conflicting mandates for port authorities (Government of Western Australia 2011a; Pyvis 2011). In

addition to this challenge, the Government of Western Australia recently announced port governance reform to consolidate WA ports into five port authorities namely Kimberley, Pilbara, Mid-West, Southern and Fremantle port authorities (Table 4.10).

Table 4.10: Port governance reform of Western Australia

Port name	Types of port	Ownership	Port management
Fremantle Ports	Metropolitan port	Public	Fremantle Port Authority
• Broome Port • Derby • Wyndham • Cockatoo Island • Koolan Island and • The proposed port at James Price Point	Regional port	Public	Kimberley Ports Authority
• Port Hedland • Dampier Port, proposed ports at • Anketell and Ashburton North • The SPA (Shipping and Pilotage Act 1967) ports at Port Walcott, Cape Preston, Varanus Island, Barrow Island, Airlie Island, Thevenard Island and Onslow	Regional port	Public	Pilbara Ports Authority
• Geraldton Port • Proposed port of Oakajee, and • The SPA ports at Cape Cuvier and Useless Loop	Regional port	Public	Mid-West Ports Authority
• Bunbury Port • Albany Port and • Esperance	Regional port	Public	Southern Ports Authority

Information source: Government of Western Australia (2012)

The Fremantle port authority already exists and will remain as a stand-alone port authority (Government of Western Australia 2012). All ports including small non-port authority (proclaimed) ports and some proposed new ports at James Price Point (Kimberley), Anketell (Perth), Ashburton (Pilbara region) and Oakajee (mid-west of WA) would come under the jurisdiction of these five port authorities. The reason for this consolidation

is to ensure better safety, planning, port development coordination, economies of scale and resource for smaller regional ports.

4.5.6 Ports in Northern Territory

The Northern Territory (NT) hosts four ports among which Darwin Port is a government owned corporation. It is the only regional port in NT administered by the Darwin Port Corporation (DPC) under the provision of the *Darwin port Corporation Act 2005* (Darwin Port Corporation 2011). The growth in the oil and gas sector in the region requires the Port of Darwin to be more innovative, interactive and strategic in community involvement and stakeholder management. For this purpose, a review of the regulatory framework for the Port of Darwin was conducted and recommendations are yet to be finalised by the government (Darwin Port Corporation 2011; Northern Territory Government 2009).

The review suggests the establishment of transparent licensing criteria and independent appeal process for providing competitive pilotage services. This is because potential conflicts of interest exists as DPC is a provider and regulator of the pilotage service at present (Northern Territory Government 2009). The other three ports in NT are principally single user privately operated small ports. These ports are Gove port, operated by Nabalco Pty Ltd.; Milner Bay port, operated by Groote Eylandt Mining Company; and Bing Bong port, operated by Carpentaria Management Services. Table 4.11 shows the ports of Northern Territory (NT).

Table 4.11: Ports of Northern Territory

Port name	Types of port	Ownership	Port management
Darwin Port	Regional port	Public	Darwin Port Corporation
Gove	Single user regional port	Private	Nabalco Pty Ltd.
Milner Bay	Single user regional port	Private	Groote Eylandt Mining Company
Bing Bong	Single user regional port	Private	Carpentaria Management Services

Source: Ports Australia (2013b); Port Directory (2013); Monson (2013)

4.5.7 Ports in Tasmania

There are 13 ports in Tasmania; of them, four main regional ports include Devonport, Burnie, Bell Bay (Launceston), and Hobart. The other small ports are Triabunna, Strahan, Stanley, Smithton, Grassy, Currie, Whitemark, Lady Barron, and Latta (see Table 4.12). In 2006, the amalgamation of the four major port authorities of Tasmania concluded with the formation of the Tasmanian Ports Corporation Pty Ltd. (TasPorts), a Government (State) Owned Corporation under the jurisdiction of the *Port Companies Act 1997 (Tasmania)* (ACIL Tasman 2009; BITRE 2008b; Everett 2009).

Table 4.12: Ports of Tasmania

Port name	Types of port	Ownership	Port management
Burnie Port	Regional port	State owned	Tasmanian Ports Corporation Pty Ltd (TasPorts)
Devonport Port	Regional port	State owned	Tasmanian Ports Corporation Pty Ltd (TasPorts)
Hobart Port	Regional port	State owned	Tasmanian Ports Corporation Pty Ltd (TasPorts)
Bell Bay (Launceston) Port	Regional port	State owned	Tasmanian Ports Corporation Pty Ltd (TasPorts)
• Triabunna • Strahan • Stanley • Smithton • King Island (Grassy and Currie) • Spring Bay • Flinders Island	Regional port	State owned	Tasmanian Ports Corporation Pty Ltd (TasPorts)
• Port Latta	Regional port	Private	Operator- Grange Resources

Source: ACIL Tasman (2009); Ports Australia (2013b)

As an island state, Tasmanian economy is heavily dependent on ports for its export-import activities. All these ports except port Latta are now managed by the Tasmanian Ports Corporation Pty Ltd (TasPorts). Port Latta is operated by a private operator engaged in bulk mineral export (ACIL Tasman 2009).

The corporation structure of TasPorts is the GOC model, limited by shares and incorporated under the Corporations Act. This provides the port with a business environment with minor political and bureaucratic intervention (Everett 2009). TasPorts introduces a notable community and stakeholder involvement in the management systems. For example, the ports of Stanley and Smithton there is extensive participation of local business people through a committee (TasPorts 2012).

In summary, various privatised and corporatised port governance models exist for Australian regional ports. It is not clear from the literature whether these port governance models provide adequate support and flexibility to regional ports to be involved in regional development or not, where access to port development funding, enhance financial autonomy, nurturing environment, increased private sector participation, collaborations with other regional organizations, proactiveness in involving with regional networks to exploit business potential of the region, and stakeholder management are critical issues to investigate. In this context, it is important to explore the perceptions of key Australian regional ports officials and government stakeholders about Australian regional ports involvement in regional development. Besides, it is important to examine the benefits of private sector participation in ports' governance for the Australian regional ports' effective contribution to regional development.

4.6 National ports strategy of Australia

Ports are important infrastructure for trade efficiency in Australia. The trade performance of Australia is closely related to the productivity, living standards and quality of life, determining Australia's position in global economy (Infrastructure Australia 2010a). A coordinated approach for future planning and development of Australia's ports and freight infrastructure is essential to improve trade performance. This objective had motivated the Australian Government to prepare the National Ports Strategy (NPS). Tasked by the Government, Infrastructure Australia and

National Transport Commission developed the National Ports Strategy for the purpose of developing efficient, sustainable ports and related freight logistics.

The objectives of the NPS include the improvement of the capability of port related freight movement across infrastructure networks; to decrease freight movement related externalities; and to influence freight related policy including safety, border management and transport security (Infrastructure Australia 2010a). Periodic review, assessment, and update of these priorities and actions are crucial for good strategy and are well documented in the NPS.

The NPS adopts four priorities:

- planning for relevant ports;
- confirming executable plans;
- enhancing landside efficiency, reliability, security and safety of container ports; and
- promoting clarity, transparency and accountability.

In addition to these priorities, various actions are planned which include integrated planning on jurisdictions, regions and precincts levels; utilisation of lead agency or coordinator concept for general framework in each jurisdiction; introduction of buffer strategies in policies and plans; supply chain coordination for container ports; research on port issues and approaches; and information sharing for better understanding of regulatory constraints.

The NPS was developed to cover bulk commodity ports and container ports which include most of the regional ports and metropolitan ports. As such, the NPS does not differentiate between metropolitan ports and regional ports. The NPS also intends to support other national issues such as economic networking relating to ports and supply chains, capital city

planning, national transport framework, road reform program and national freight network. In addition, the NPS was developed to meet the challenges of Australian ports as outlined in Figure 4.3. These include the main two challenges of creating adequate and consistent capacity of the ports and the consolidation and resolution of various parties' port-centric interests (Infrastructure Australia 2010b). In addition to meeting the common challenges throughout Australian ports, the NPS identifies enhanced possibility of economic networking among ports. This is achieved through competition and cooperation along supply chains (Everett & Robinson 2013). Nevertheless, the essential issues of the Australian port sector include the encroachment by the freight industry, while balancing freight requirements, meeting community, traffic requirements, land planning and corridor preservation. An additional issue includes the identification of future port-related infrastructure requirements within the context of forecasted demand and productivity expectations (Infrastructure Australia 2010b).

The submissions and background papers of the NPS specify the scope of activity and economic role of the port beyond its boundaries. One of the background papers, submitted by GHD Pty Ltd (a consulting firm formerly known as Gutterridge Haskins and Davey), indicates that meeting financial targets and playing trade facilitation role is a broader objective, yet can be challenging for a port (GHD 2010e). It also asserts that any investment or service of the port that may bring short term loss but long term economic return for the port or local region is beneficial. This suggestion clearly supports the prospect of a port's broader role for regional development.

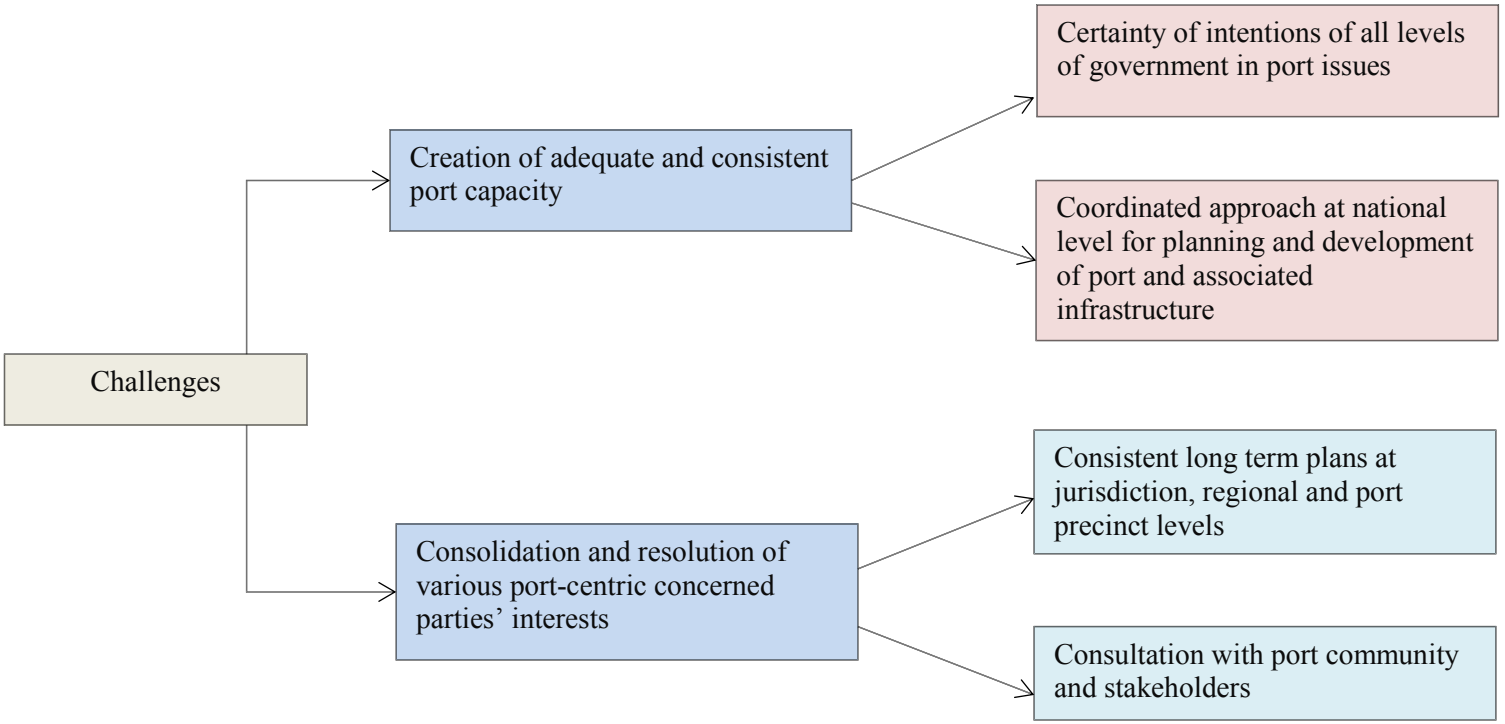


Figure 4.3: Challenges of Australian ports in accordance to the NPS

Information source: Infrastructure Australia (2010b)

Australian ports including regional ports require greater legislative support and port planning to play a broader role to regional development (GHD 2010c). However, an appropriate balance of bureaucratic and political intervention is required to support ports' business sustainability and regional development. An effective port plan may ensure this balance and can integrate the requirements of other spatial level plans where port authorities can be the lead agencies as assessment managers (GHD 2010b). For example, the UK Government prefers port development for supporting economic and social cohesion along with efficient and sustainable transport links (GHD 2010d).

The integration of port planning with other regional spatial planning agendas should be reciprocal in nature. The NPS emphasises port's planning documentation to be consistent with the jurisdictional level of planning (Infrastructure Australia 2010a). This reciprocity in planning entails the strategic role of regional ports in regional development. Port planning guidance can be a fundamental tool in developing port strategy and promoting a port's role within regional development. At times, planned port development may create spare port capacity for the region due to external factors. In addition, spare port capacity helps assure resilience for the national infrastructure which is crucial for regional development and enhances flexibility in inland distribution patterns (GHD 2010d). The degree of accuracy in forecasting; understanding the drivers of demand, monitoring the triggers of change; planning in advance for change; and acquiring the ability of adaptation are crucial for effective port planning (GHD 2010e). All these aspects of port planning require close involvement with the region to ensure sustainability in port business.

In addition, the efficiency of land side activities of the port related freight corridor is another crucial element for overall economy in Australia (GHD 2010a). The network of port related freight corridors should be identified and rationalised in such a way that it further stimulates the geographical

reach of business activities and hereby regional development efforts. A robust port within such corridors with logistics planning framework may induce investments and effective land use decisions (GHD 2010b). In the NPS, overcoming underinvestment in infrastructure and underperformance in ports remains unclear (NFF 2010). However, the involvement of regional ports in regional development may help to ease port underinvestment and underperformance through consultation with the community, business, and port stakeholders.

The forecast of port freight task becomes significant in developing port plan and in determining port strategy. The freight task is dependent on the annual growth rate of an economy (GHD 2010e). The LNG, iron ore, and containerised cargo sectors are growing significantly in Australia. The freight task of ports in Australia tends to double every ten years with a compound annual growth rate (CAGR) of 7.5%. The freight task could be increased three to six times with a typical business-as-usual trade CAGR of 5.0-7.5%. However, it could double over 25 years with a low trade CAGR of 2.5% (GHD 2010e). To meet these growing cargo sectors and freight task demands, the future requirement of port infrastructure should be planned. It also may address regional development purpose. The exploration of the possibility of regional ports and their linkages with the land freight network is vital for this reason (GHD 2010e). The way forward is to develop future national port structures through the creation of intermodal capacity, and linking ports to the local, state and national framework. It is also achieved through determining a national port hierarchy in the context of national and global supply chain (Infrastructure Partnerships Australia 2009b).

Many of these challenges require a spatial strategy which fits within the strategic role of Australian ports to regional development. The determination of port hierarchy may ignore the potential of regional ports when comparing metropolitan ports, extra-large resource ports and smaller

regional ports (Infrastructure Partnerships Australia 2009b). Obtaining sufficient consideration for planning from the State and Federal governments is one of the challenges regional ports face. This is in addition to providing channel depth for larger vessels and building adequate landside connectivity (Asciano 2010). It is imperative for State and Federal governments to provide consistent growth opportunity for all regions as 'the collocation of these [spatial] assets [that is, ports and regions together] forms an economic precinct that is critical to national productivity and prosperity' (Infrastructure Partnership Australia 2009, p.11).

Although the benefits of the NPS are considered invaluable, Everett and Robinson (2013) argue the successful implementation of the NPS requires more attention on jurisdictional issues. The Australian system of government presents different levels of jurisdictions, responsibilities and decision making processes at Federal, State and Local levels of Government. This scenario has the potential to impede the successful implementation of the NPS and to become even worse with a change of political government, which can restrict the spirit of the plan. Coordination among different levels of government, a balanced public-private partnership, stakeholder and community involvement and more importantly political consensus are required for successful implementation of the NPS. In the context of regional ports, it is critical to explore the perceptions of ports stakeholders for the necessity of public-private partnership, collaboration and cooperation with other regional organisations, stakeholder management and community involvement of ports.

4.7 National land freight strategy and regional ports

The nature of freight task in Australia is diverse, involves various scales of operation, services and activities (BTRE 2006b). The freight task mainly involves interstate freight movement, long haul freight movement such as

mining regions to ports, and short haul freight movement, for example freight movement within capital cities (BITRE 2010b). Figure 4.4 shows the domestic freight movements in Australia.

The ports of Australia are central and integral part of Australia's freight supply chains (Infrastructure Partnerships Australia 2009b). As important infrastructure in regions, regional ports act as links in the freight networks of Australia to facilitate export, import and shipping. Figure 4.5 shows an indicative map of the national land freight network. Most of the catchment areas of freight for port related supply chains are regional Australia, cities, mining or agricultural areas. As such, any congestion in ports has a potential ripple effect down to the distant regional areas (Infrastructure Australia 2011).

The potential ripple effect is overcome through the broader national land freight strategy. It is an integral part for the national ports strategy in Australia (NFF 2010). The consistency among the national land freight strategy, transport infrastructure and the national ports strategy is vital. It provides interoperability, network improvement, planning, ownership, regulation, and community service obligations. It is the cornerstone in providing competitive advantages to Australian products including agricultural commodities (Infrastructure Australia 2011). Many freight movements in Australia require multi-leg journeys, which involve several modes. While air transport involves a high value, small volume freight movement, road remains the dominant mode of freight transport (BITRE 2010b; BTRE 2006b). Nevertheless, rail and shipping freight transport has a vast potential to carry a large amount of bulk commodities per vehicle (Infrastructure Australia 2011).

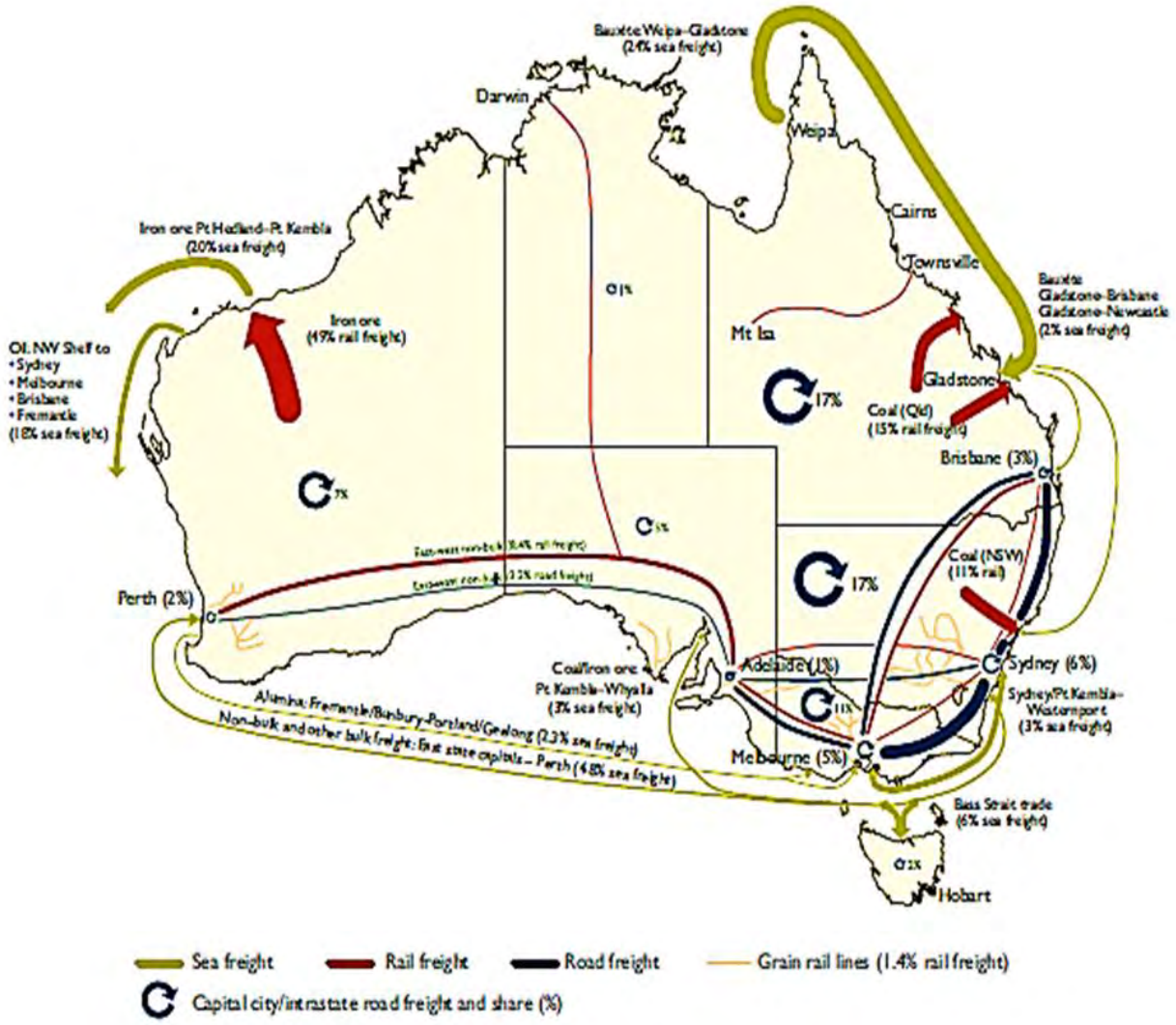


Figure 4.4: Major Australian domestic freight movements, 2006-07

Source: BITRE (2009d, p.4)

Figure 4.5: Indicative map of a national land freight network

Source: Infrastructure Australia (2011, p.6).

Within domestic freight movement, very little direct competition exists between road and rail in Australia. The exception is the inter-capital non-bulk freight market segment and branch-line grain transportation where road and rail compete (BITRE 2009d). Conversely, the sea freight movement between East coast states and Perth, in the West, competes with rail (BITRE 2009d). As an intermodal linkage, rail movements significantly take place between iron ore or coal mines to Western Australia ports in tonnage terms (BITRE 2012). This process also takes place in a smaller scale but similar way for minerals, grain and steel products as outlined in Figure 4.6, which show rail lines used for intermodal movements in Australia.

Figure 4.6: Intermodal movements in Australian rail network

Source: BITRE (2012, p.4).

A new and prompt plan to cope with this rapid growth is critical as building new transport infrastructure requires longer lead time and can have substantial impact on the Australian way of life (LINC 2006). Currently, road and rail perform most of the domestic freight task in Australia, while coastal sea freight plays an insignificant role (Infrastructure Partnerships Australia 2009a). As shown in Table B-3 in Appendix B, the tonnage of coastal shipping performed approximately 2% of the total domestic freight task in 2006-07 (BITRE 2009c, 2011a). In terms of tonne-kilometres (number of tonnes multiplied by distance travelled in kilometre), coastal shipping performed of around 25% (see Table B-4 Appendix B) of the total domestic freight task (Ports Australia 2011). The performance of coastal shipping increases in terms of tonnage-kilometres as coastal sea freights travel longer distances in those routes.

Beyond the domestic freight task, sea transport dominates international freight, both for bulk and non-bulk freights (Infrastructure Partnerships

Australia 2009a). Sea transport performs approximately 99% of international freight task of Australia (BITRE 2011a; Ports Australia 2013b). In addition, State and Territory contributions for international and coastal sea freights vary considerably (see Table B-5 and B-6 in Appendix B). This indicates State-wise variations in exploring the potential resources of the regions and a lack of gaining competitive advantages of the regional products to global market. However, the total freight is rapidly increasing.

An inability to address the anticipated freight growth of Australia has the potential to create other problems such as urban congestion, pollution, slow delivery times and thereby increase delivery costs . This may have immense impacts on socio-economic condition and regional development efforts as Australian products may lose the competitive advantage. As a result, Australia's national income may be reduced and standard of living may deteriorate.

The National Land Freight Strategy suggests various methods to cope with the future growth of freight task in Australia. The most significant methods include the best use of infrastructure; the integration of freight; greater responsiveness of infrastructure to demand; an introduction of dedicated freight infrastructure; and long term land use planning which includes land reservation for future infrastructure development (Infrastructure Australia 2012).

In addition to these strategies, a review of Australia's freight transport task indicated freight clustering, intermodal connectivity of ports to hinterland, freight clustering sites and further use of coastal shipping were strongly recommended (NTC 2006). The review also suggests fair pricing of infrastructure by internalising the externalities and adjusting the cost of wear and tear, and promoting the use of more efficient vehicles. All these suggestions indicate better utilisation of port infrastructure and coastal

shipping in Australia. The increase of the share of coastal shipping can be a facilitating factor for sustainable freight movement.

Beyond a sustainable freight movement at the port, the productivity of a port is influenced by the freight agility through the supply chain. In many instances, the freight to and from ports typically involves inter-modal activities and cluster sites (Infrastructure Partnerships Australia 2009b). The discussion paper on the National Land Freight Strategy of Australia clearly identifies freight cluster sites of Melbourne (Western interstate and Donnybrook), Sydney (Moorebank and Eastern Creek), Brisbane (south west Bromelton and north), Perth (Kewdale/Forrestfield), Gold Coast and Canberra (Infrastructure Australia 2011). The intermodal connectivity of these freight sites to regional ports is critical for smooth flow of freight. The paper also identifies five metropolitan ports and some networked ports in regional centres. These networked ports include Townsville, Abbot Point, Gladestone, Newcastle, Port Kembla, Hastings, Geelong, Portland, Esperance, Bunbury, Port Hedland, Dampier, Geraldton/Oakajee, Darwin, Launceston/Bell Bay which are the principal freight nodes (Infrastructure Australia 2011). The strength and sustainability of consolidation of ports within regions depends on the consistency of both physical and strategic connections among freight clustering sites. The port strategy towards regional development may contribute to increasing this effort.

4.8 Shipping in Australia and Australian regional ports

The importance of shipping to Australian regional ports is vital as it is a connector between land side port bound cargo movement and sea side shipping activities. In Australia, regional ports bound cargo should be handled efficiently in terms of cost and speed. This will bring improved economic outcomes.

An efficient and effective transport system is indispensable to economic growth for an island nation, like Australia, where ports and shipping are

central. Shipping moves about 99% of the trade in Australia, while, ports handle about $200 billion worth of cargo. This is approximately 10% of world's total sea trade (House of Representatives 2012). Beside only five metropolitan ports, 65 regional ports are heavily involved with this big volume of sea trade. In this context, a combination, consolidation and integration of various transport modes including shipping and ports would facilitate establishing an efficient and effective transport system in Australia.

Australia has a vast coastline of approximately 37,000 nautical miles. When including islands this figure increases to almost 60,000 nautical miles (O'Connor 2010). The share of coastal shipping in domestic freight task in Australia is decreasing steadily due to the increasing proportion of road and rail share in inter- and intra-state freight movement (Australian Shipowners Association 2008; Everett & Robinson 2013). With no container vessels involved in coastal trade, the number of vessels in coastal trading fleet engages completely in bulk cargo transportation is rapidly declining in Australia (Everett & Robinson 2013). The declining trend in coastal shipping is mainly due to the absence of a stable financial and regulatory regime (House of Representatives 2012). The Australian coastal shipping regime is liberal enough for foreign flagged vessel (Everett & Robinson 2013), and in comparison with other major countries the government of Australia played a non-interventionist role in case of supporting coastal shipping in recent past (Figure 4.7).

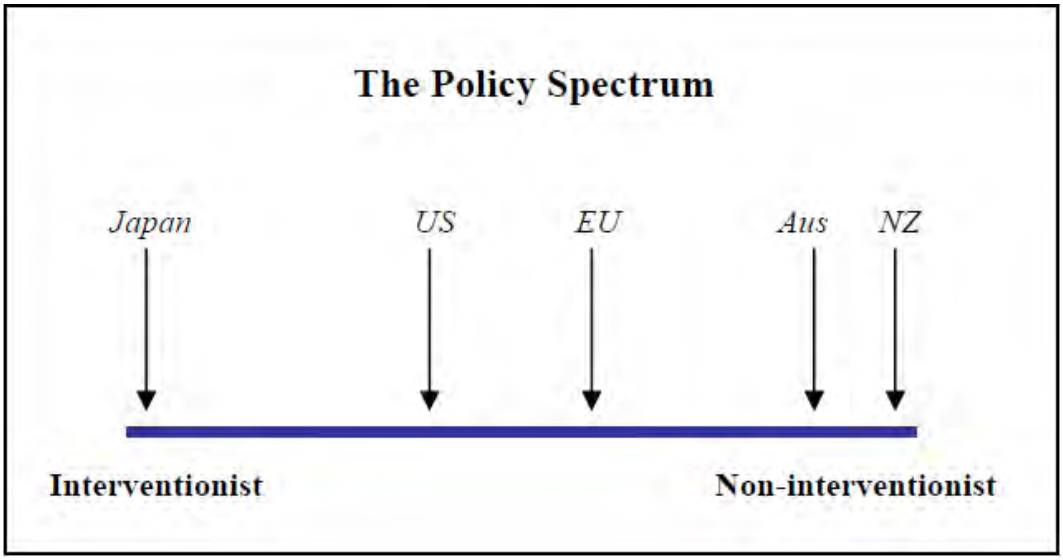


Figure 4.7: Governmental policy spectrum for coastal shipping

Source: Meyrick and Associates (2007, p.143).

Recently, realising the necessity of a more dynamic shipping particularly coastal shipping in national freight transportation, the government of Australia passed a number of Bills to revitalise shipping, particularly coastal shipping to fill this gap (Australian Shipowners Association 2012; House of Representatives 2012). The Bills are listed below:

- *Shipping Reform (Tax Incentives) Bill 2012*
- *Tax Laws Amendment (Shipping Reform) Bill 2012*
- *Shipping Registration Amendment (Australian International Shipping Register) Bill 2012*
- *Coastal Trading (Revitalising Australian Shipping) Bill 2012*
- *Coastal Trading (Consequential Amendments and Transitional Provisions) Bill 2012*

The purposes of these Bills are as follows:

- Promoting investment and supporting a viable shipping industry
- Facilitating long term growth
- Enhancing Australian participation in international shipping by increasing Australian flag ships

- Enhancing efficiency and reliability
- Maximising the use of Australian registered vessel
- Creating a skilled workforce
- Ensuring safety, training, and environmental standards

In order to have a stronger shipping for a stronger economy, one of the important objectives of this package is to create a level playing field for coastal shipping (Australian Government 2012; House of Representatives 2012). According to this package, the tax reforms encompass five tax concessions, that are income tax exemption from certain shipping activities, accelerated tax depreciation for expenditure on certain vessels, balancing charge deferral and roll-over relief on disposal of certain vessels, royalty withholding tax exemption for non-Australian residents chartering certain vessels to Australian charterers, and a tax offset for Australian employers of Australian seafarers. The seafarer tax offset has been increased from 27% to 30% (Maybury & Tang 2012).

The key measures arising from the reforms package are as follows (Bosma 2012):

- The use of permits to access the coastal trades will no longer be valid. Vessels will now be required to hold either a general, temporary or emergency licence.
- There are substantial tax incentives for Australian registered vessels which comply with the qualifying provisions.
- The introduction of clear reporting and publishing requirements for establishing a more transparent system of shipping regulations.
- Those vessels holding a general licence will be afforded some protection through the right to lodge a notice in response to any temporary licence applications.
- Foreign registered vessels will be able to apply for a transitional general licence which will provide them with a 5 year period to transition to Australian registration, but during which time they must

employ Australian maritime workers, and will not have access to the taxation incentives.

- Specific employment requirements will be applied to each type of licence in order to encourage the employment of Australian maritime workers.
- The provision for significantly increased civil penalties in cases of failure to comply with the reporting and licencing requirements of the new legislation.

However, the negligence or non-intervention of the Australian government in this sector for a long period, in addition to most of the road and rail infrastructure still being provided by government created a large vacuum. As such, more support is required than simply aiming to make a level playing field for coastal shipping. Further attention is required to understand and boost the kind of service attributes and awareness of ports to support coastal shipping (Everett & Robinson 2013). The viability of coastal shipping in Australia depends on the connectivity and alignment of the coastal routes with the integrated supply chain network, service frequency and delivery reliability, and the competitive capital and operating costs with respect to other alternatives (Everett & Kittel 2010). The cargo interests will find competitive advantage for coastal shipping if there exists favourable trade-offs among price, transit time, flexibility, and reliability in service (Brooks 2010).

Everett and Kittel (2010) note that the parallel initiatives of governments, such as road or rail and coastal shipping, in terms of policy framing and support provisions are not prominent in Australia. Under the auspice of community service obligation and development, governments have a tendency to fund road or rail projects. These generate pollution and further require governments' investment in on-going up keep and environment cleaning projects. However, coastal shipping does not receive government support despite of the fact that it has substantial environmental and social

benefits. Government support remains crucial for coastal shipping in addition to the right policies and subsidies or incentives.

The Maritime Union of Australia (2007) has presented two priority features that need to be incorporated in port planning frameworks and port development sequences for boosting the coastal shipping in Australia. One feature is the maintenance of priority capacity for existing domestic shipping, for instance, the Bass Strait shipping trade. The other feature is the enabling priority for domestic container shipping stevedoring capacity. At present, these require federal and state governments' policy and financial supports. As road and rail sectors receive different forms of subsidies and tax incentives, coastal shipping seeks policy and financial boosts to flourish as a balance among the transport modes. Meyrick and Associates (2007) in their study, report the port access issues of coastal sea freight as the critical success factor to build a competitive coastal shipping industry in Australia. They propose preserving the priority of an ideal day berthing window for coastal shipping at the Australian metropolitan ports. This requires further study and appropriate regulatory and policy support from the various governments.

Trade and shipping is the lifeline for Australian regional ports. The regional ports are inevitable for export cargo transportation in Australia. The share of coastal shipping in domestic cargo movement needs to be improved where Australian regional ports are the critical strategic infrastructure. The access to regional ports, intermodal connectivity of regional ports to hinterland, connectivity of regional ports to freight clustering sites and logistics, efficiency in terms of cost and speed in cargo handling at regional ports are important factors to increase the share of coastal shipping. As an island nation any reform leading to strong shipping strategies would ensure better placement of regional ports to serve the overall national interests in broad context. As international shipping already plays a vital role in Australia's export and import tasks, coastal

shipping and the establishment of the motorways of the seas connecting regional ports needs to be further developed to construct a more balanced and sustainable freight transport future.

4.9 Regional ports' impact on regional economy

Like any port, Australian regional ports have significant regional economy is significant. Port services and activities generate socio-economic wealth and benefits in the region (Bichou 2009), indicating the potential role of ports in regional development. The contribution of a port as an infrastructure to facilitate economic development is well recognised (Jing & Qing 2009; SKM 2010; UNCTAD 2008; UNESCAP 2002; Zhaoliang et al. 2009). Nevertheless, a dearth of research exists on wider social and cultural effects of port activities (Bryan et al. 2006). A port can have direct and indirect or flow-on effects on different sectors of the regional economy (Chen et al. 2012; Evans & Hutchins 2002). The direct impacts coming from transport and port services include employment opportunities, contribution of port to GDP, and other value added logistics services and ports' multiplier effects (Evans & Hutchins 2002; Ferrari 2011). The indirect impacts forms as businesses and firms in the region gain advantages from the port, such as better access to markets, attraction of direct investment in the region, enhancement of tourism industry, and improvement of locational offer and regional marketing prospect (Evans & Hutchins 2002; Ferrari 2011). The mutual activities of a port with transport operators, local authorities and policy makers bring social and economic benefits to the region (Evans & Hutchins 2002).

Although the direct employment opportunities in ports are reducing due to competition with other transport modes and increasing mechanisation in ports (Evans & Hutchins 2002), the overall contribution of port to the economy is rising because of increasing involvement of ports in supply chains and logistics processes (Bryan et al. 2006). This indicates the

potential of ports as driving force in overall economy (Suykens & Van De Voorde 1998) of the region.

With the available data, Table 4.13 shows the economic impact of some of the Australian regional ports. The impact of regional ports on regional economy in Australia has been assessed by the Bureau of Transport Economics (BTE), presenting a general framework for port impact study based on Input-Output approach and providing port-specific multipliers (BTE 2000). According to this general framework, the total economic impact of a port consists of direct effects which include primary level output, value addition, employment and household income, and the subsequent flow-on effects to other sectors of concerned economy. As shown in Table 4.13, Port Kembla as a regional port in New South Wales has enormous $899m (as of 2009) flow-on impact on the regional economy and generates 4,524 full time equivalent (FTE) employments Port of Hastings and Geelong are regional ports of Victoria contributing $67.4m and $360m worth of primary level outputs to the economy respectively. Port of Geelong alone has $181m worth of value added impact. The ports of Mackay and Gladstone regional ports of Queensland generate about 501 and 1,758 FTEs employments respectively. The Port of Esperance, a Western Australian regional port, has $45m worth of primary level output and $24.2m worth of value added benefit to the economy. Overall, besides direct primary level output, all of these regional ports have sufficient value added impact, impacts in household income and employment generation.

Table 4.13: Economic impacts of some Australian regional ports

Name of Port	Year of Study	Impact measures ($m)											
		Output ($m)			Value added ($m)			Household income ($m)			Employment (FTEs)		
		Direct effects	Flow-on effects	Sub total (S1)	Direct effects	Flow-on effects	Sub total (S2)	Direct effects	Flow-on effects	Sub total (S3)	Direct effects	Flow-on effects	Sub total (S4)
Port of Hastings	2005-2006	35.9	31.5	67.4	20	15.6	35.5	6.7	8.6	15.3	110	141	251
Port of Geelong	2010	186	174	360	94	87	181	37	46	83	612	689	1301
Port Kembla	2009	499	512	1,011	280	252	532	148	135	284	2,190	2,334	4,524
Port of Mackay	1999-2000	29	27	56	18	14	32	10	7	17	212	289	501
Port of Gladstone	1999-2000	135	89	224	93	46	139	44	24	68	738	1020	1,758
Port of Esperance	1999-2000	29	16	45	16.3	7.9	24.2	6.6	3.7	10.3	130	116	246

Data source: BTE (2001a, 2001b); EconSearch (2001, 2009, 2012); Meyrick and Associates and EconSearch (2007)

As conducting economic impacts of ports is a costly and time consuming affair, the regional ports of Australia either do not have the amenity of conducting such impact study or even update these types of impact study reports in a regular interval. It reveals a fact that these ports require a less expensive and quickly producible impact study method. This type of impact study would be more effective and would provide regular update opportunity.

4.10 Lacuna in literature and requirement for an empirical study

This chapter reviewed the current situation of Australian regional ports (ARPs) in the context of discussions in chapters 2 and 3. The geographical settings indicate ARPs as critical conduits for their host regions. They serve as gateways for their regions, but little is known from the literature about their involvement with the regional communities, organisations, and businesses.

As an infrastructure service supporting organisations in their regions, ARPs may be involved in social, economic, environmental and spatial dimensions to contribute to regional development. But it is not known from the literature what types of strategic initiatives ARPs adopt to contribute to regional development. Based on their characteristics, the gaps or lacuna relating to ARPs and regional development can be grouped into five categories:

1) Port and region relationship

Australian regional ports have a symbiotic relationship with their host regions. However it is not known which activities ARPs undertake to build and strengthen the relationship between ports and regions, or how ARPs maintain and enhance community relations to help build trust and networks among regional businesses and entities.

2) Regional development and ports

It is found that the strategy of APRs to contribute to regional development varies from port to port due to the different geographical attributes of each port-region. However it is not apparent from the literature what factors drive regional development in the port-region. Nor is it clear whether ARPs' involvement in Government's regional development programmes can enhance the social inclusion of ports.

3) Ports' current issues

Limited access to funding for port development is a problem for ARPs. Private sector participation in ports may ease this limitation. Privatisation and corporatisation are widespread for the port sector in Australia. An enhanced public-private partnership needs to be achieved to better serve the regions. There is a growing trend for private sector participation in Australian metropolitan ports, but little is known about the necessity and attractiveness of regional ports for public-private partnerships. It is also out of the scope of the literature review to explore issues in day-to-day operations and management of ARPs and the impact of regional opportunities and constraints on port development. Due to the lack of research it is not known whether ARPs consider stakeholder management for strategic planning.

4) Ports' proactiveness in regional engagement

A port's involvement in regional development is significant because of the co-dependence of the port and the region in which it operates. A geo-dimensional role of port authority is emerging (Verhoeven 2010) which indicates increased involvement of ports in regional development where information generation, collection and sharing about the region and its interacting issues and participation in regional resource configuration are critical. To better understand the leadership and proactiveness of ARPs, it is the interest of this research to know the perceptions of key ARP stakeholders on the possibility of ARPs' involvement in multi-stakeholders

initiatives, supply chain efficiency, information generation and sharing about the region, and participation in regional resource configuration.

5) Ports' participation in regional innovation

Regional innovation is critical to regional development. The use of regional resources and infrastructure is at the core of regional development strategy. In this regard, promoting and participating in regional innovation system (RIS) should be the cornerstone for the strategic approach of an organisation to effectively contribute to regional development. In this context, it is necessary to know how ARPs can be engaged in the RIS.

In the context of five areas mentioned above, further empirical study is undertaken by this research to understand the perception of key Australian regional port stakeholders on how ARPs can be actively involved in regional development.

4.11 Summary

This chapter discussed regional development in Australia and reviewed Australian regional ports in order to understand regional ports' involvement in their host regions. In Australia, about 85% of the total cargo handling task is performed by 65 regional ports and the rest is performed by five metropolitan ports which are heavily tasked with import cargoes. Regional ports are mainly purpose built and export task oriented. Australian regional ports have a symbiotic relationship with their host regions. They serve as gateways for their regions. The involvement of Australian regional ports in regional development may enhance the social inclusion of ports. Privatisation and corporatisation is widespread for the port sector in Australia. An enhanced public-private partnership needs to be achieved to better serve the regions.

The national ports strategy (NPS) recognises the pivotal positions of Australian ports including regional ports and related infrastructure.

Appropriate governance and the implementation of a national land freight strategy and a national ports strategy are crucial for achieving competitive advantage for Australian regional products. The share of coastal shipping in domestic freight needs to be improved and Australian regional ports need to play an efficient role in this. The NPS further recognises the potential for Australian ports to play a leading role in facilitating domestic and international maritime trade, and in promoting collaboration among ports, transport infrastructure and other regional businesses.

The perception of port stakeholders is a key element for implementing an effective strategic role for ARPs in regional development. It is these stakeholders who can provide clear information on the interrelating issues of Australian regional ports and regional development in different settings. The strengths and constraints of the regions, the relationships among ports and their host regions and regional development, regional ports' current issues, proactiveness of ports' in engaging in regions, and the requirement of ports' participation in regional innovation system are the areas where further exploration is required. Further to this is the need to explore the characteristics of ARPs' activities in community engagement, stakeholder management, regional leadership, participation in multi-stakeholder initiatives, boosting regional preferences, and corporate social responsibility. With this intension in mind, further empirical investigation has been planned and reflected in the research methodology. The following chapter presents the methodology of this research.

CHAPTER 5: RESEARCH METHODOLOGY

5.1 Introduction

The first four chapters of this study introduced the background of the research question and presented the literature review that directed this research. The literature review revealed a lack of research on regional ports as well as a gap in understanding ports' strategic involvement in regional development. This chapter illustrates the research methodology in detail and presents the mixed methods (MM) research strategy adopted to address the research gap as it relates to Australian regional ports. The exploratory sequential design begins by exploring Australian regional port stakeholders' perspectives on regional development via semi-structured telephone interviews in the qualitative strand and further investigates the Australian regional ports' involvement in regional development through a web-based questionnaire survey in the quantitative strand. The findings of qualitative strand inform the quantitative strand during the development of the survey instrument and final data interpretation. The exploratory sequential mixed method design was chosen as neither qualitative nor quantitative strand alone is sufficient to address the research purpose.

The remainder of this chapter is structured as follows: Section 5.2 discusses the research philosophy and describes the research purpose and the unit of analysis. Section 5.3 presents the need to adopt a mixed method research strategy, illustrating the conceptual framework, the research question and describing the research design and approach. Section 5.4 presents the qualitative strand (phase one) of this research in detail, covering sampling strategy, research ethics, data collection and analysis, and the reliability and validity of the qualitative data. Section 5.5 illustrates the dominant quantitative strand (phase two) covering sampling strategy, data collection and analysis. It further discusses data

interpretation, integration and inference, including reliability and validity of the quantitative data. Section 5.6 deals with bias management and error control, followed by a summary in Section 5.7.

5.2 Research philosophy

The research philosophy is a paradigm or world view that guides the nature and development of knowledge in the research process (Creswell & Plano Clark 2011). The choice of a research philosophy is important as it helps researchers shape the way they conduct their research and influences the overall research process, including selection of research strategy and methods for data collection and analysis. The practical considerations of a research purpose influence the selection of a research philosophy (Creswell & Plano Clark 2011; Tashakkori & Teddlie 2003a; Teddlie & Tashakkori 2009).

Creswell and Plano Clark (2011) name four research paradigms such as post-positivism, constructivism, participatory and pragmatism. These paradigms deal with three aspects of research known as epistemology, ontology and axiology. Post-positivism focuses on cause-and-effect, reductionism, theory verification and relates to the quantitative approach. Constructivism works through understanding phenomena, accommodating multiple meanings, social interaction, historical construct, theory generation and is associated with the qualitative approach. Participatory paradigm is expressed through political concern, collaboration, empowerment, change orientation and is usually associated with qualitative approach. Pragmatism focuses on consequences of actions, problems, pluralistic perspectives, real world practise and practicality and is associated with mixed method research. Among the three research aspects mentioned above, epistemology helps management researchers to assess a suitable level of knowledge in their particular research area, ontology helps to construct efficient interpretations about the research process, and axiology expresses the judgment of values (Saunders, Lewis

& Thornhill 2009). These aspects are intrinsically connected with the research paradigms.

In the context of divergent thinking, a quantitative approach expresses a subjective view (that is, post-positivism) and a qualitative approach addresses societal factors (Symonds & Gorard 2010). A mixed methods approach allows the combination of quantitative and qualitative approaches, with pragmatism as a philosophical paradigm, to better address research problems (Creswell & Plano Clark 2011). Pragmatic paradigm involves the mixture of qualitative and quantitative methods and treats paradigms as a continuum, rather than opposing philosophical assumptions (Creswell & Plano Clark 2011), which is required for the purpose of this research.

In order to explore the strategic role of Australian regional ports in regional development, this research will identify the factors affecting regional development; examine the current strengths and weaknesses of ports; and explore the port-region relationship. This research belongs to a business research area and must accommodate the perspectives of various port stakeholders. Furthermore, it needs to acknowledge singular and multiple realities, while remaining practical, and thus follows the philosophy of pragmatism. Based on the practical considerations of the research purpose and research questions, the philosophy of pragmatism must be applied to utilise the paradigm's pluralistic and consequence focused nature. This underpins the decision to use a mixed methods approach in this research.

5.2.1 Research purpose

The importance of mutual relationships and interdependence between ports and regional development was demonstrated through literature review. As stated in chapter 1, comparatively little research has been done in this regard, particularly on regional ports in a national context. The role

of Australian regional ports in regional development is enormous (Infrastructure Australia 2010a), but how ports can facilitate efficient transport systems, support projected freight growth, participate in regional innovation, promote economic growth, and play an effective role within the regional network, demand further study (Brooks 2012). Therefore, the purpose of this research is to explore the role of Australian regional ports and to propose strategic initiatives for those ports to be better involved in regional development.

5.2.2 Unit of analysis

The unit of analysis refers to the unit of data collection (Yin 2011), and is about what or who should deliver data and at what level of aggregation it should be investigated (Zikmund et al. 2010). The research purpose and research questions will determine the unit of analysis. Australian regional ports (ARPs) are the unit of analysis in this study. There are 65 regional ports in Australia as well as five metropolitan ports. The data collection levels for this research are the Australian regional port stakeholders relating to ports and regional development.

The concept of port stakeholders was initially proposed by Notteboom and Winkelmans (2002). They categorise port stakeholders as internal and external from a port authority perspective and address stakeholders' impact on port operations and management. Several studies involving port stakeholders in port management and strategic planning have been done, for example Dooms and Verbeke (2007), Winkelmans and Notteboom (2007), and Denktas-Sakar and Karatas-Cetin (2012). This research takes a broader view of port stakeholders to include various interest groups within the port and in its region. Following the concept of port stakeholders by Notteboom and Winkelmans (2002), this research categorises port officials as internal port stakeholders. Other port users, businesses, chambers of commerce, logistics service providers, government officials,

regional development agencies and the local community are categorised as external port stakeholders.

A regional port needs to operate sustainably whilst providing effective port services for the region and catering to demand. However, other or external port stakeholders, such as regional development organisations, shire councils, and different government departments, play a role at a policy and planning level which affects a port's involvement in regional development. To explore the strategic role of Australian regional ports in regional development, the cooperation of both internal and external port stakeholders is crucial.

5.3 Research strategy and design

Research strategy is an overall research plan for answering the research question(s) (Saunders, Lewis & Thornhill 2009). Creswell (2009) describes it as the strategy of inquiry or approach of inquiry. He states that there are three research strategies: qualitative, quantitative, and mixed methods. The research designs corresponding to each strategy are shown in Table 5.1. Each research design may have different and innovative variants based on the necessity and choice of data collection tools, sampling strategy, and data analysis techniques.

Table 5.1: Alternative strategies of inquiry and research designs

Strategies of Inquiry	Probable choices of research designs
Qualitative research	Narrative research, Phenomenology, Ethnographies, Grounded theory, Case study, Archival research
Quantitative research	Experimental designs, Survey research, Case study, Action research
Mixed methods research	Convergent / Concurrent designs, Sequential designs, Embedded designs, Transformative designs, Multiphase designs, Action research

Sources: Creswell (2009); Creswell and Plano Clark (2011); Crowe and Sheppard (2012); Saunders, Lewis and Thornhill (2009); Scandura and Williams (2000)

In general, the choice of a research strategy is guided by the research questions and objectives, the extent of existing knowledge on the topic, time allocated for the research, available resources, and the researcher's philosophy (Saunders, Lewis & Thornhill 2009). Taking these issues into consideration, the mixed methods research strategy has been chosen for this research, and this is discussed in the following section.

5.3.1 Mixed methods research strategy for this study

Johnson, Onwuegbuzie and Turner (2007) provide a comprehensive definition of mixed methods research:

> 'Mixed methods research is the type of research in which a researcher or team of researchers combines elements of qualitative and quantitative research approaches (e.g., use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the broad purposes of breadth and depth of understanding and corroboration' (p. 123).

Mixed methods research is a single piece of research adopting a pragmatic or realistic perspective for combining qualitative and quantitative data. It has the advantage of making distinct inferences on identifiable qualitative and quantitative data, and integrating those results in such a way that is more coherent and comprehensive than either of the strands alone (Tashakkori & Creswell 2007). The characteristics of a mixed methods research strategy pave the way to better addressing the research purpose and research question(s) of this study.

The general perspective of the role of Australian regional ports in regional development has not been found in the literature. The absence of conceptual model for ports involvement in regional development and the lack of both qualitative and quantitative research from port's strategic perspective necessitate the purpose of generating a conceptual model through a qualitative inquiry and then validating it quantitatively. Given the

author's philosophical assumptions as a pragmatist, to address the gaps in the existing literature and to serve the research purpose, this study adopts a mixed methods strategy with an exploratory sequential design.

Approaching the participants directly (Collins, Onwuegbuzie & Sutton 2006), semi-structured telephone interviews have been used to explore and identify the emerging issues for Australian regional ports. The results of the qualitative strand have assisted in the development of a web-based survey instrument (questionnaire) for further investigation in the quantitative strand (Greene, Caracelli & Graham 1989). The quantitative strand allows more in-depth exploration of the themes emerging from the qualitative strand (Collins, Onwuegbuzie & Sutton 2006; Greene, Caracelli & Graham 1989). The exploratory sequential mixed methods design ensures the overall quality of the research by combining research findings and consolidating data interpretation.

5.3.2 The conceptual framework of this research

A theoretical framework synchronises existing thoughts and experience in a research area, and forms the basis of a study (Sinclair 2007), while a conceptual framework offers a self-audit facility for the research and provides directives within the research process (Leshem & Trafford 2007). Khan (2011) describes a conceptual framework as an operationalization tool in the theoretical framework of a research. This research engages in a multi-disciplinary study involving role of port in region and regional development. The literature review suggests a theoretical framework as follows, and presents a conceptual framework for this research in Figure 5.1.

Theoretical framework:

> *The role of Australian regional ports in concerned regions is central to regional development, which requires further innovative strategy to flourish.*

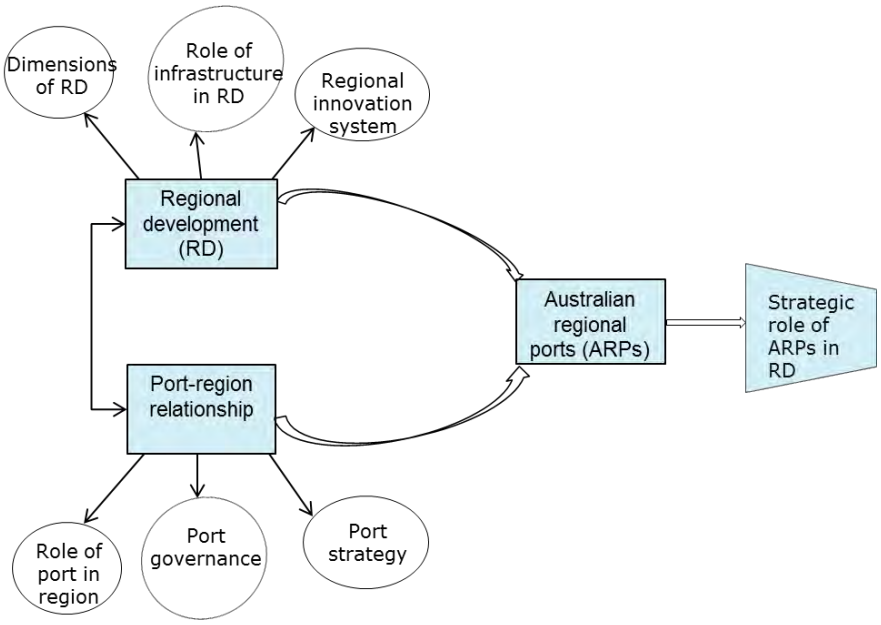


Figure 5.1: The conceptual framework of this study

The conceptual framework of this research indicates the research areas, for example the port-region relationship and regional development, in the context of Australian regional ports. It represents the theoretical standing of the areas of investigation and their connection to each other (Punch 2006). It delineates the elements of the research, such as regional development, infrastructure in regional development, regional innovation system, role of the port in its region, port governance and port strategy. The conceptual framework also directs the purpose of the research, that is, to explore the strategic roles of Australian regional ports in regional development, in the form of a travel plan (Sinclair 2007). Finally, it demonstrates the operationalization of the theoretical framework by defining the boundaries of the literature review, and by indicating connections between abstract concepts and empirical data as a graphic representation of researcher's working theory (Leshem & Trafford 2007).

5.3.3 Research questions

Research questions are an extension of the research purpose (Tashakkori & Teddlie 2010). They occupy a central, interactive, emergent, and evolving position in the mixed methods research process (Onwuegbuzie & Leech 2006). In this sequential design of mixed methods research, the research questions of the quantitative strand evolve on the basis of the outcomes of the qualitative strand. It establishes an important bond between the research purpose, the conceptual framework, and the validity of the research methods (Tashakkori & Creswell 2007). An explicit mixed methods question is then framed, which integrates both the qualitative and quantitative strands and directs the data collection and data analysis for ultimate inference. The explicit mixed methods research question reinforces the formation of the exploratory sequential design of this research (Tashakkori & Creswell 2007). The research questions in this study are framed as follows:

Qualitative strand:

RQ 1: How are Australian regional ports currently involved in their host regions?

RQ 2: What is the scope for Australian regional ports to be involved in regional development?

Quantitative strand:

RQ 3: What are the factors pertinent to Australian regional ports' involvement in regional development?

RQ 4: What strategic initiatives can be undertaken by Australian regional ports to be better involved in regional development?

The explicit mixed methods research question (Ex-MMQ):

Ex-MMQ: How can Australian regional ports effectively contribute to regional development?

5.3.4 Research design

Research design guides ethical matters, defines sampling techniques and dictates data collection, analysis, interpretation and reporting, in order to achieve the research objectives (discussed in section 1.3) and answer the research questions (Cooper & Schindler 2011; Creswell & Plano Clark 2011; Creswell et al. 2003; Crowe & Sheppard 2012). In this study, the research questions in the qualitative strand evolved during the literature review by identifying gaps in the research. The research questions of the quantitative strand emerged from the results of the qualitative stand, and were explored via a questionnaire. Finally, the explicit mixed methods research question was formulated to enable integration of the outcomes of both strands and to meet the research purpose.

Scholars have identified several basic types of mixed methods research design (Creswell & Plano Clark 2011; Leech & Onwuegbuzie 2009; Morse 2003; Nastasi et al. 2007). For example, Creswell and Plano Clark (2011) classify four basic types of mixed methods design, namely, convergent parallel design, embedded design, explanatory sequential design, and exploratory sequential design (Angell & Townsend 2011; Creswell & Plano Clark 2011; Creswell et al. 2003). In convergent parallel design, complementary but different data on the same topic is collected concurrently in the same phase of research process to obtain a complete understanding of the research problem (Creswell et al. 2003). The embedded design contains a larger quantitative or qualitative strand with a smaller strand of other method embedded in it (Angell & Townsend 2011). It is used to examine the significance of measures where a single data set is not sufficient to answer different questions. The explanatory sequential design has two separate interactive phases starting with a quantitative strand to assess trends followed by a qualitative strand to explain the reasons behind the resultant trends (Creswell et al. 2003). The exploratory sequential design in mixed methods research occurs in sequence with two separate but interconnected phases to explore a phenomenon or problem

and its prevalent dimensions in depth (Creswell & Plano Clark 2011; Creswell et al. 2003). This research adopts an exploratory sequential design. Figure 5.2 shows the flow of an exploratory sequential design. The first phase of this design involves exploratory qualitative data collection and analysis. In the second phase, the researcher extends the understanding of the qualitative data through a quantitative data survey (Creswell 2012; Teddlie & Tashakkori 2009). This design is also known as instrument development design (Creswell, Fetters & Ivankova 2004) or the quantitative follow-up design as the researcher develops an instrument (questionnaire or scale items) depending on the qualitative results and uses it for the subsequent quantitative data collection (Creswell & Plano Clark 2011).

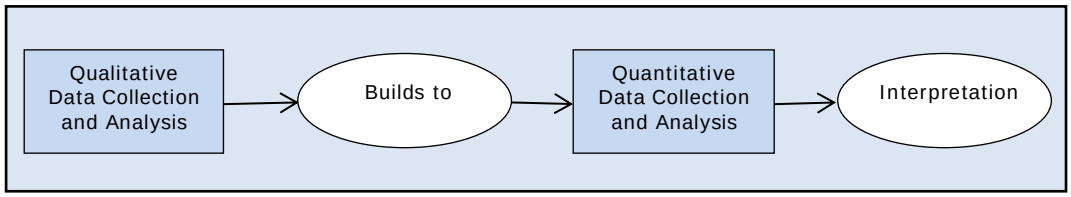


Figure 5.2: A typical exploratory sequential design

Source: Creswell and Plano Clark (2011, p.69)

As the topic of this research is a little explored area, the literature review found a lack of academic literature on Australian regional ports and their roles within regions and regional development. Despite the immense potential that exists for Australian regional ports to be more involved in regional development, no single research has been found showing nationwide regional ports as the unit of analysis. For this reason, an exploratory sequential design of mixed methods research has been adopted to explore the perspective of Australian regional ports. The exploratory characteristics of the research questions which emerged during the research process support this choice of exploratory sequential design.

This research explores the key port stakeholders' views about the role of Australian regional ports in regional development, and this requires a qualitative data collection method which interacts with those port stakeholders. Further, the research requires generalising and strategically expanding the role of Australian regional ports in regional development. This necessitates a quantitative enquiry to investigate the possible strategic initiatives of Australian regional ports to be involved in regional development. Another reason for choosing the exploratory sequential design was the lack of underlying constructs for Australian regional ports' contribution to regional development.

There are two types of variants for the exploratory sequential design: the theory development variant in the qualitative strand (expressed as QUAL) and the instrument development variant in the quantitative strand (expressed as QUAN). The quantitative strand is given priority in designing this research method as it further explores and generalises the outcomes of the qualitative strand in addressing the research questions. The resulting instrument is developed for web-based survey in quantitative strand is also the vital interlinking tool between the two strands. Figure 5.3 shows the overview of the exploratory sequential design of this mixed methods research. Creswell et al. (2003) specify four points for deciding on the type of mixed methods design such as implementation, priority, integration, and theoretical perspective. The key elements in creating an appropriate mixed methods design are the level of interaction between the strands, the relative priority of the strands, the timing of strands, and the procedure for mixing the strands (Creswell & Plano Clark 2011; Leech & Onwuegbuzie 2009).

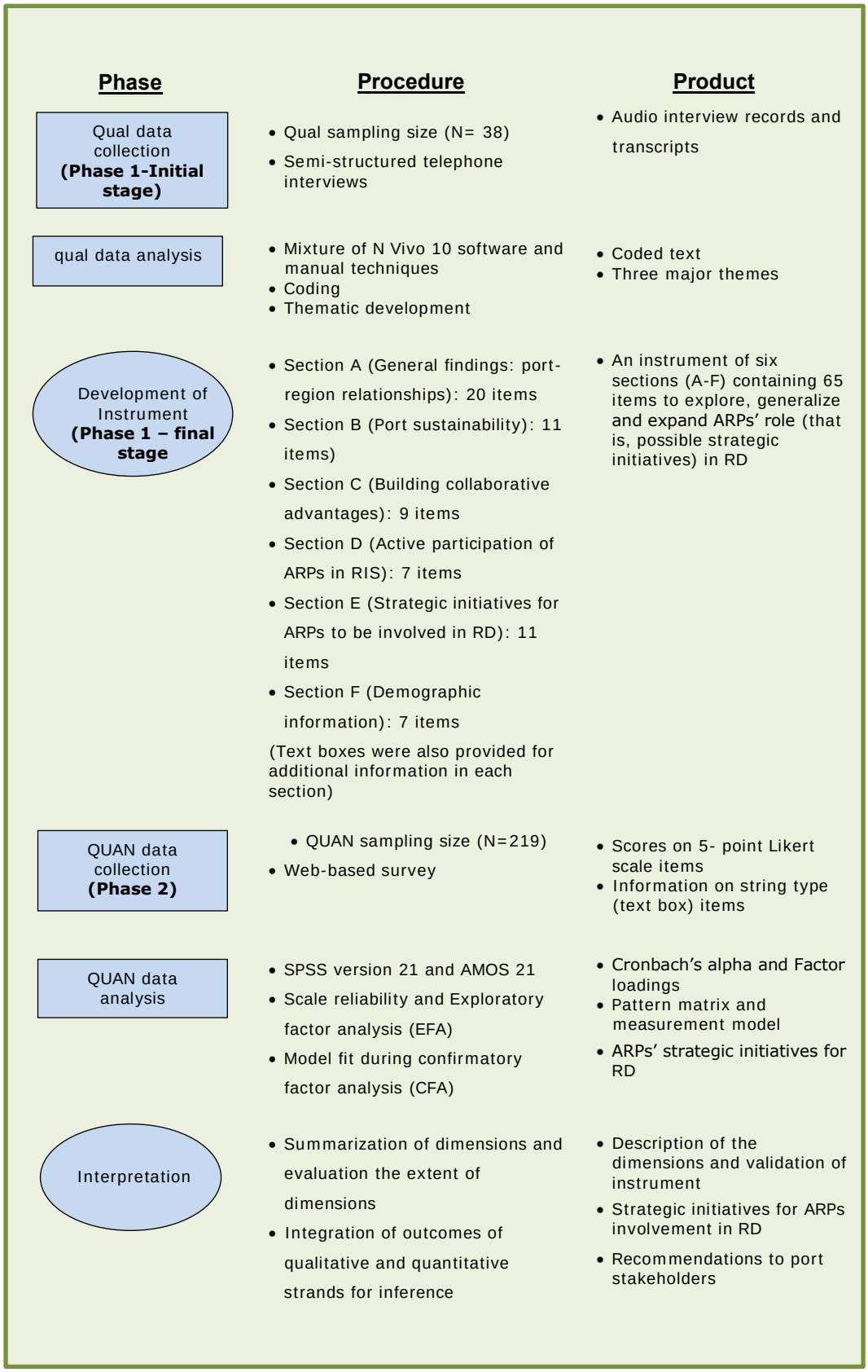


Figure 5.3: Overview of the exploratory sequential design of the research

Source: Adapted from Creswell and Plano Clark (2011)

In terms of these elements, following is the further discussion on why the exploratory sequential design is adopted for this research:

1) The level of interaction between the strands:

Generally, full or partial interaction occurs between the two strands (Leech & Onwuegbuzie 2009). In this research, mixing occurs at instrument (questionnaire) development and interpretation levels. The extent of interaction between the strands is partial, as there is limited scope to address all themes emerging from analysis of the qualitative data.

2) The relative priority of the strands:

In this research, the qualitative and quantitative strands are complementary to each other in answering the research questions. However, priority is given to the quantitative strand, as it examines the strategic initiatives for Australian regional ports in regional development. The qualitative strand explores key port stakeholders' perspectives on the role of Australian regional ports in regional development. The quantitative strand further explores and generalises the qualitative outcomes and investigates the strategies which may involve regional ports effectively in regional development.

3) The temporal relationship (timing) between the strands:

This research has two distinct phases connected through instrument development (discussed in section 6.7 of chapter 6). A sequential timing exists between the two strands, starting with the collection and analysis of qualitative data (see Figure 5.3). In the absence of in-depth research covering all Australian regional ports, phase one explores the current situation of Australian regional ports and their contribution to regional development through qualitative semi-structured telephone interviews. In phase two, a quantitative online/web-based survey is used to generalise

and expand the outcomes of the qualitative strand. These two phases unify the total research design.

4) The procedure for mixing the strands:

Points of integration and mixing strategies are important for mixing the two strands. Data collection and analysis of the qualitative strand help in developing a survey questionnaire for the quantitative strand. Themes, codes and quotes from the qualitative data are used to frame scale items in the questionnaire. Mixing at the interpretation level generalises the findings, expands the topic, and answers the research questions in more depth.

5.3.5 Research approach

The research approach refers to the method of reasoning in the research process (Saunders, Lewis & Thornhill 2009). It is a general term for two research approaches, deductive and inductive (Burney 2008). According to Saunders, Lewis and Thornhill (2009), the deductive research approach involves the adoption of a research strategy to test a theoretical proposition, while the inductive research approach involves developing a theory through the observation of empirical data. The deductive approach is usually associated with quantitative methods along with objectivity and causation, whereas the inductive approach is usually associated with qualitative methods along with subjectivity and meaning (Leedy & Ormrod 2010; Morgan 2007).

The mixed methods research may encompass both deductive and inductive approaches in the research process (Creswell & Plano Clark 2011; Leedy & Ormrod 2010; Morgan 2007). Moving between the inductive and the deductive approach is also very common in mixed methods research. Morgan (2007) refers to this as abductive reasoning, and it relates well to the pragmatic paradigm of this research. The adoption of a combination of deductive and inductive approaches

strengthen inferences in answering the research questions, which is the major advantage of mixed methods research (Molina-Azorin 2012).

In this mixed methods research, deductive and inductive approaches are adopted in various stages in both the qualitative and quantitative strands. The literature review has the characteristics of both deductive and inductive approaches (Creswell 2012), however, in this research the deductive approach has a dominant role in the literature review process. One of the products of the literature review is the generation of a semi-structured telephone interview questionnaire. The telephone interview itself is mostly an inductive process (Scandura & Williams 2000). Analysis of the telephone interviews generates several significant themes, which help to build the quantitative instrument. Both inductive and deductive approaches (dominated by inductive approach) play a critical role in this process (Onwuegbuzie, Bustamante & Nelson 2010). The quantitative outcomes are 5-point Likert scale responses in which the deductive approach remains at the core of the data analysis process (Morgan 2007).

The interpretation and mixing of the results of both strands employs both methods of reasoning and draws inductive inferences. In this mixed methods research, as Morgan (2007) points out, the inductive outcomes from the qualitative strand contribute to the deductive goals of the quantitative strand, and vice versa. The infusion of inductive and deductive approaches in several stages enhances the quality of the findings (Saunders, Lewis & Thornhill 2009; Scandura & Williams 2000).

5.4 Phase one – Qualitative strand

The procedure for data collection in this qualitative strand consists of setting a sampling strategy, obtaining approval, collecting and recording data, and administering the procedures (Creswell & Plano Clark 2011).

5.4.1 Sampling strategy

Choosing a sampling strategy depends on the pattern of questions that will be asked, methods chosen, and available resources (Kemper, Stringfield & Teddlie 2003). The aim of sampling is to select elements from a population concerned with the research topic in order to draw reliable conclusions about the entire population and the topic (Cooper & Schindler 2011). A sampling frame (target population) is the record of sampling units (individuals in a population) that an investigator can easily access and can select a sample from (Creswell 2012). It is, therefore, the lists of elements of a population from which a sample is drawn (Cooper & Schindler 2011). Selecting an appropriate sampling frame increases the representation of the sample and the credibility of the research outcomes.

In mixed methods research, both probability sampling and non-probability (purposive) sampling is employed, with sample sizes ranging from small to large depending on the research questions and the unit of analysis. The main focus remains on 'both depth and breadth of information across the research strands' (Teddlie & Tashakkori 2009, p.181).

A snowball sampling technique was applied in this qualitative strand. It is a purposive sampling strategy (Onwuegbuzie & Collins 2007; Patton 1990) and an appropriate technique for qualitative research where participants are well placed in referral networks, but difficult to identify (Cooper & Schindler 2011). This type of sampling was adopted to explore the dimensions of the topic (Bergman 2011), and to locate informed participants (Patton 1990). The lack of literature and knowledge on this research topic made it difficult for the researcher to locate key participants. A snowball sampling technique requires the investigator to ask the initial participants to identify other participants who have knowledge about the research topic (Creswell 2012). This technique gathered sample units during the data collection phase, and formed an appropriate sample size (Teddlie & Tashakkori 2009).

For this qualitative strand, an initial list of possible participants was prepared consisting of key senior officials and managers of Australian regional ports and other port stakeholders, such as regional development agencies, government stakeholders, and port users. The list was based on the researcher's knowledge and experience after reviewing the literatures and databases, attending the Regional Ports, 2011 Conference, and skimming the websites of Australian regional ports and their stakeholders. The participants' positions in relation to the topic and accessibility to them were considered as the criteria for the initial sample list. This sample list was further validated through consulting with a small number of experts and officials.

The initial sample group formed the basis for data collection. During the semi-structured telephone interviews, the participants were asked to refer other relevant potential participants. The recommended names were checked following the same criteria as before, and appropriate participants were interviewed. This process continued until saturation occurred in getting new information on the topic (Teddlie & Tashakkori 2009). 38 telephone interviews took place, and included samples from various port stakeholders. This result is well above the average interview size of 12 participants when employing mixed methods research (Onwuegbuzie & Collins 2007).

5.4.2 Research ethics

A good procedural regime provides an opportunity to reflect on significant ethical issues in research (Israel & Hay 2006). These ethical issues include informed consent, confidentiality and anonymity, ownership of data and conclusion, use and misuse of results, honesty and trust, reciprocity, intervention and advocacy, harm and risk, and conflict of interest (Punch 2006; Resnik 2011). In MM research, the context and demands of both

qualitative and quantitative research settings need to be considered in addition to the usual ethical issues (Teddlie & Tashakkori 2009).

The ethical issues were addressed throughout the research process. As suggested by many authors (Creswell & Plano Clark 2011; Crowe & Sheppard 2012; Hesse-Biber 2010; Tashakkori & Teddlie 2010), the research problem area and topic were selected following a preliminary literature review and discussions with academics, colleagues, and supervisors in the Maritime and Logistics Management (MLM) department of the Australian Maritime College (AMC). A thorough literature review was conducted on concepts in regional development, role of a port in region, and Australian regional ports and regional development. The research topic was then presented to a panel for candidature confirmation. The panel recognised the research problem area and approved the research topic for further endeavour. The formal ethics approval was then pursued for the research.

Ethics approval for social research in the University of Tasmania (UTAS), falls under the authority of Human Research Ethics Committee (Tasmania) Network [HREC(Tas)] (UTAS 2011). The Tasmania Social Sciences HREC (SS HREC) is the approving authority for the ethics proposal of this research. The requirements of the ethics proposal for SS HREC reflect The National Statement (NS) on Ethical Conduct in Human Research (Australian Government 2007b) and The Australian Code for the Responsible Conduct of Research (Australian Government 2007a). The following strategies were adopted to prepare the ethics proposal and to deal with the SS HREC:

- Identified risk/review level for ethics application.
- Completed low risk ethics application form, information sheet, consent form, semi-structured telephone interview questionnaire (pre-tested) and interview schedule.

- A provision was also created to submit an ethics addendum to the Ethics Committee for the clearance of the survey instrument and the quantitative strand. This has also been discussed in section 6.7.3.
- Consulted with supervisors and submitted the initial ethics application to the Ethics Committee with the permission of the Head of the School.
- Responded to the comments from the Ethics Committee and re-submitted the application.
- Obtained ethics approval (see Appendix-A).

In addition to addressing ethical issues such as high personal integrity and values throughout the research process (Israel & Hay 2006; Kennedy 2005), the following measures were also taken, acknowledging suggestions by numerous authors such as Creswell (2009, 2012), Creswell and Plano Clark (2011), Resnik (2011), Teddlie and Tashakkori (2009), Bazeley (2009), Bell and Bryman (2007), Crow et al. (2007), Punch (2006), Israel and Hay (2006) and Cahoon (2004):

1) Informed consents were collected from participants before commencing data collection.
2) An information sheet was given to the participants. It outlined the research purpose, reason for the invitation, participants' involvement, participants' benefits (reciprocity), potential risks, research results, confidentiality and anonymity, data recording, storage, and ownership, and concerns, contacts and complains procedure.
3) The covering letter formally invited the participants to take part in telephone interviews; it mentioned the two phases of data collection and the anticipated timeframe for data collection; it reiterated the reasons behind the study and the participants'

selection; and it explained about confidentiality, research benefits and results.

4) The consent form clarified the ethical issues to ensure the participants' well-being in the study.
5) Rigorous techniques were used for data analysis in each strand, with a provision of data integration.
6) For data interpretation and inference, emphasis was on evidence based logic and analysis, rather than as a conclusion to analysis.

Following approval of the SS HREC for the research project, the researcher commenced data collection through semi-structured telephone interviews.

5.4.3 Data collection method and procedure

A semi-structured telephone interview (TI) was adopted for collecting data because it permitted easy access to concerned participants in organisational settings (Lepkowski et al. 2008) and it allowed the researcher to gather relevant information quickly (Johansen & Wedderkopp 2010). The telephone interviews also generated sufficient information to re-conceptualise the issues under investigation (Teddlie & Tashakkori 2009). In semi-structured interviews, the topics and issues are outlined beforehand, and questions are fine-tuned by the interviewer as the interview progresses (Teddlie & Tashakkori 2009). In telephone interviews, the interviewer has more flexibility and control.

As this is the first research of its kind to explore the current position of all Australian regional ports in their regions, the semi-structured telephone interview was selected due to its flexibility, speed and accessibility. Australia's regional ports are scattered across the entire coastline of the nation. The major advantage of using semi-structured telephone interviews for this strand was that the interviewer was not required to travel in order to conduct the interviews (Carr & Worth 2001). The adoption of

telephone interviews provided essential quality data within a reasonable timeframe and cost (Ibsen & Poulsen 2007; Lepkowski et al. 2008). It was, therefore, the most effective method for this research, in comparison to data collection by mail or through face-to-face interviews.

5.4.3.1 Administering data collection through telephone interview

Through a snowball sampling technique, a total of 45 invitation letters were posted to selected participants. In the initial stage, 15 letters were sent out to the first group of participants, all of whom were interviewed. A further 30 letters were sent to participants whose names were recommended by the participants of the first group. Those individuals were checked using the same criteria as the first group, and 23 participants from the second group were interviewed. The telephone interview data collection ended when information saturation occurred. This procedure ensured an effective snowball sampling technique for the qualitative strand.

An initial email was sent to each interview participant and was followed by a telephone call one week later. This was done in order to obtain the consent of the invitees and to arrange a suitable date and time for the telephone interviews. Consequently, 38 interviews were conducted in a quiet room equipped with a dedicated telephone line and a digital recording device. A watch was used to follow the time track and the telephone interview protocol was used to guide the telephone interview process. Notes were also taken in the margins and vacant spaces of the protocol for the purpose of clarity and cross-checking during transcribing the telephone interviews.

5.4.3.2 Pre-testing in the qualitative strand

A ‘pre-testing’ or ‘pilot study’ is a test drive in a small group to check interview questions’ comprehensibility and workability of the data

collection process (Teddlie & Tashakkori 2009). Based on the literature review, two separate sets of basic questionnaires for the semi-structured telephone interviews were formulated for both types of participants, that is, for port officials (internal port stakeholders) and external port stakeholders. The questionnaire for port officials contains ten open-ended questions, and the questionnaire for port stakeholders contains eight open-ended questions (see Appendix C). These questionnaires were then pre-tested. Four summary short questions (yes-no, binary scale) were also planned to ask at the end of each telephone interview.

For the pre-testing, Salant and Dillman (1994) recommend including researchers and academics with experience as interviewers. Following this suggestion, the telephone interview questionnaires were pre-tested with five participants. Two of them had interviewing experience, two were preparing to conduct telephone interviews, and one was a high ranking official from an Australian regional port. As Cahoon (2004) suggests, pre-testing participants were also asked to comment on the covering letter, information sheet, consent form, and telephone preamble. On average, it took around 40 minutes to answer all of the questions. As a result of this pre-testing, the questionnaire was reviewed by deleting, adding and revising some of the questions. The reviewed questionnaires were then submitted with other documents for ethics approval (see Appendix C).

5.4.4 Data analysis

The data analysis in mixed methods research can begin at any point during the data collection process. It can involve several stages, such as data reduction, data display, data transformation, data correlation, data consolidation, data comparison, and data integration (Onwuegbuzie & Teddlie 2003). In the qualitative strand, data analysis involved data reduction, data display, and data transformation. The recorded interviews were transcribed into word files and important points were noted for each interview.

An alpha numeric label was applied to each transcript. As well as this manual technique, NVivo 10 software was used to create and mark codes, quotes and memos, and to identify the themes in the process of analysis (Bazeley 2003, 2007). Many software programs are available, such as Atlas.ti, HyperResearch, MAXQDA, and NVivo (Creswell 2012). NVivo 10 has been used because it is Windows PC enabled and has the capacity to manage non-numerical and unstructured data. It also offers quick coding, thorough exploration, and comprehensive analysis of qualitative and mixed methods research (Creswell 2012; QSR International 2012).

Adopting Morgan's (1998) illustration mentioned in Sandelowski (2003), the transcribed word files have been analysed in four steps. Morgan's illustration is a systematic process that reduces the risk of losing context when using software in the data analysis process. In the first step, ten informative transcripts were selected based on the interviewer's judgment. In the second step, a further ten transcripts were chosen in blind judgment, and general themes were identified after analysis. In the third step, the remaining 18 transcripts were analysed to identify composite themes. In the fourth step, the analysis was discussed with academics, professionals and supervisors in order to identify the major themes and variables leading to instrument development (discussed in chapter 6, sections 6.4 to 6.7).

The qualitative strand adopted an inductive thematic data analysis approach with data display strategy (Teddlie & Tashakkori 2009). This allowed the exploration of themes and helped in data reduction through thematic analysis and memoing (Onwuegbuzie & Teddlie 2003; Teddlie & Tashakkori 2009). Data analysis includes techniques such as creation of codes and themes, identification of quotes that hold the tone of the research and transformation of data, in other words, the quantification of the qualitative data (effect size). It facilitates the identification of extreme

outliers from the qualitative data, the development of survey items for the quantitative phase, and the creation of a code occurrence matrix and a code similarity matrix (Creswell 2009; Creswell & Plano Clark 2011). Through extensive discussion about the major themes (Creswell 2012), different charts, tables, figures, text data matrices, and effect matrices were used to display data analyses (Bryman 2008; Creswell 2012; Onwuegbuzie & Teddlie 2003; Teddlie & Tashakkori 2009).

5.4.5 Reliability and validity in qualitative strand

Research reliability describes the degree of reproducibility and consistency of a measure in different circumstances (Bryman 2008; Hammersley 1987). In mixed methods research, it is necessary to ensure the reliability and validity of each strand (Teddlie & Tashakkori 2009). In qualitative research, reliability refers to the dependability and quality of the research; while validity refers to credibility and trustworthiness (Golafshani 2003; Teddlie & Tashakkori 2009). The reliability and validity of the qualitative strand are discussed below:

1) Reliability

The reliability of the qualitative strand in this study was ensured by adopting the following measures:

- A systematic and thorough literature review was undertaken to identify the common concepts of this interdisciplinary research involving port-region relationship and regional development. AS well as Google search, the University of Tasmania databases such as ProQuest, EBSCO and PubMed, citation indexes such as Web of Science and Web of Knowledge, various eJournals, library books and catalogues, and document delivery system were all used to gather relevant literatures. This step ensured the credibility of the research and provided input for generating a reliable semi-structured telephone interview questionnaire (Teddlie & Tashakkori 2009).

- Interview questionnaires were pre-tested in a small group consisting of academics and experts. This verifying measure confirmed the practicality of the interview instrument and ensured reliability (Cooper & Schindler 2011; Van Teijlingen & Hundley 2001).
- As a requirement of the snowball sampling procedure for this strand, the selection of initial participants through consultation with a small number of experts and officials ensured reliability of the sample (Cooper & Schindler 2011; Patton 1990).

2) Validity

The validity of the qualitative strand was ensured through the following:

- The telephone interview participants were informed about the research objective, confidentiality, record keeping and the reason why they were selected for interview. They were acknowledged about their subjective judgments through invitation letters (Tashakkori & Teddlie 2003a).
- During the telephone interview, the interviewer remained non-reactive (Tashakkori & Teddlie 2003a), and did not impose any personal experience, beliefs or judgments (Roberts, Priest & Traynor 2006).
- Interviews were recorded and notes were taken, and these were revisited several times during transcription, data analysis, and final inferences (Creswell 2012).

5.5 Phase two – Quantitative strand

In the quantitative strand, data was collected through a web-based survey. A web-based survey is located on an internet website and it consists of a self-administered questionnaire which respondents can access and complete using compatible web browsers (Simsek & Veiga 2001).

A web-based survey has been used for data collection in the quantitative strand due to its speed and accessibility to the diversely located regional ports and their stakeholder organisations (Ahern 2005; Albrecht & Jones 2009; Simsek & Veiga 2001). Due to the growing use of computer technology and the internet, particularly among professionals, online surveys are being more widely used (Perkins 2004; Roy & Berger 2004; Sue & Ritter 2007). Furthermore, a web-based survey can be used in conjunction with almost any other data collection method including a telephone interview, which is the data collection method used in this research (Simsek & Veiga 2001).

The following sections explain sampling strategy, web-survey administration, data analysis, and reliability and validity in the quantitative strand. The development of an instrument (questionnaire) is one of the outcomes of the qualitative strand which informs quantitative strand. This instrument development and pre-testing of it have been discussed later in section 6.7 as it is developed following the results of the first phase telephone interview data analysis.

5.5.1 Sampling strategy

For the web-based survey, a list-based (Fricker 2008) stratified purposeful sampling technique has been adopted to stratify port stakeholders in order to obtain homogeneous subgroups (Collins, Onwuegbuzie & Jiao 2007; Onwuegbuzie & Collins 2007; Patton 1990).

In mixed methods research, it is common to use purposeful (non-probability) sampling techniques in both strands. Onwuegbuzie and Collins (2007) provide a list of 24 sampling designs for mixed methods research, and the stratified purposeful design is one of them. Hesse-Biber and Griffin (2013) argue that mixed methods research is convenient for internet and related technologies due to the increasing number of internet users, rapid technological development and a changing online environment.

In a web-based survey, both probability and non-probability based various sampling methods can be used such as a list-based sampling, systematic sampling, convenience sampling, snowball sampling and stratified sampling (see Table D-1 in Appendix D). A list-based sampling frame can be used for high coverage (Couper 2000, 2011). It is convenient to use for survey when organisations scattered around a vast geographical area. But, the absence of internet coverage can restrict the use of this sampling frame. However, the lack of universal internet coverage, especially when multiple organisations are involved in the survey, means that selection of the sampling frame, determination of the sample size, and establishment of sample control are issues which need to be considered (Bethlehem & Biffignandi 2012; Simsek & Veiga 2001). Gosling et al. (2004) evaluate six preconceptions about internet methods and conclude that internet methods can produce quality data and can provide ample new opportunities for research (see Table D-2 in Appendix D).

Sampling control is important because it provides an understanding of the sample size and it restricts false identities, which is very common on the internet (Simsek & Veiga 2001). Bethlehem and Biffignandi (2012) suggest application of stratified sampling for web-based surveys in order to gain more control over the sample. It is more precise than simple random sampling, and it generates a more representative sample with respect to strata. In addition, the researcher can see the availability of a sufficient number of observations in each stratum.

Internet coverage is critical for generating a useful sample in a web-based survey. According to the Australian Bureau of Statistics, 2.9 million businesses and government agencies subscribed to the internet in 2012, and 97% of those subscribers accessed the internet via a broadband network (ABS 2013). This illustrates the facility for wide coverage and speedy internet access for the Australian businesses and government agencies used in this research.

The websites, directories, contact email addresses and telephone numbers of all Australian regional port stakeholder organisations and their concerned associations were found to be accessible through the internet.

The individuals targeted in this research were the stakeholders of Australian regional ports. The population consisted of internal port stakeholders which included port officials and the external port stakeholders, also termed as other port stakeholders as oppose to port officials, which included port users, businesses, chambers of commerce, logistics service providers, government officials, regional development agencies and the local community (discussed in section 5.2.2). For the quantitative strand, the port stakeholders are divided into the following three strata to ensure better represented samples:

- Stratum 1: port officials, including Australian regional ports and their associations (internal port stakeholders);
- Stratum 2: policy and planning contributors, including different levels of government and regional development agencies (external port stakeholders); and
- Stratum 3: port users including shipping companies and agents, freight and logistics service providers, business councils and associations, and Chambers of Commerce (external port stakeholders).

These three strata are non-overlapping in nature and relatively homogeneous within the groups and ensure optimum representative samples (Bethlehem & Biffignandi 2012; Patton 1990).

As this research is interdisciplinary in nature, involving Australian regional ports and regional development, the sampling frame is diverse and widely dispersed. It was essential to assemble an aggregated sampling frame,

and the internet provided a good source of information (Chen, Effler & Roche 2001). The major internet sources for generating the sampling frame are presented in Table D-3 (Appendix D). A list of emails was assembled through a rigorous web search of the organisations, consultation with the associations, literature review and through attending the 'Regional Ports 2011' conference. The sampling frames in terms of the three strata are explained in the following.

1) Port officials stratum

The Ports Australia website and documents provided a list of 70 ports in Australia of which 65 are regional ports. Some of these ports are very small, serving a local community and some had joint management with other regional ports or metropolitan ports (see section 4.5 in chapter 4). To compile an email list of port officials, Chief Executive Officers, General Managers and Business Development Managers were targeted, as they were considered to be the people most involved in decision making and in liaising with the region, the community and local businesses. If emails were not found on the port website, they were obtained via a telephone call to the relevant port. The process resulted in a list of 56 emails, including one for Ports Australia, which is the Australian ports association.

2) Port policy and planning contributors stratum

For the port policy and planning contributors stratum, the emails of Federal, State and Local government officials were collected from the relevant departments' websites. The focus was on the secretary or the deputy secretary of each department. Organograms and job descriptions were studied to select the most appropriate officials and 19 email addresses were assembled. For regional development agencies, the emails of 55 Chief Executive Officers were assembled from the Regional Development Australia website. The emails of Local Government Associations of States and Territories were procured from their websites. If emails were not found on the internet, they were obtained via a telephone

call to the relevant office. The process produced a list of 74 emails for the policy and planning stratum.

3) Port users stratum

For the port users stratum, a membership list and emails were gathered from the websites of Shipping Australia, Australian Shipowners Association, Australian Logistics Council, Australian Freight Councils Network, Supply Chain and Logistics Association of Australia and the Chambers of Commerce of Australian States and Territories. The company 360 database was also used to find contact details for transport operators, logistics service providers and shipping companies. This database is available through the UTAS library. In addition, telephone calls were made to the associations and councils. The company 360 database and concerned websites also assisted in generating a list of email addresses for State-wide Chambers of Commerce and export-import business councils. The process resulted in a sampling size of 89.

The rationales applied for purposeful sample selection were- information richness of sources, transferability of results and accessibility to the respondents (Creswell & Plano Clark 2011; Patton 1990). Adding the sampling frame of each stratum, the sample size of this strand became 219.

5.5.2 Administration of the web-based survey

Many principles of traditional surveys apply to the web-based survey (Dillman, Smyth & Christian 2009; Salant & Dillman 1994; Sue & Ritter 2007). The following measures were taken to administer the survey, taking into account suggestions of many authors (Dillman, Smyth & Christian 2009; Gosling et al. 2004; Salant & Dillman 1994; Sue & Ritter 2007; SurveyMonkey 2012):

1) The web-based design of the questionnaire was set with two types of collectors: a web link collector and an email collector. All responses were collected at one location on the SurveyMonkey website. The web link collector was set to email the survey link by using the researcher's own email. It provided the opportunity to personalise the emails and to collect anonymous responses, though the demographic questions were sufficient to analyse the characteristics of the respondents. Three email collectors for the three strata were also set to send bulk reminders to the respondents. This provided the opportunity to track respondents through the SurveyMonkey server. All collectors were set to:

- block multiple responses from respondents
- allow flexibility for the respondents to return at any time to edit or finish an incomplete survey
- save IP or Email addresses for tracking respondents

2) After setting the collectors, following Fricker's (2008) suggestion of using various modes to administer the web-based survey, a letter and a respondent information sheet were sent to the Chief Executive Officers or Heads of Associations, Councils or Organisations or Chambers of Commerce to inform them about the survey and to create a facilitating environment for the survey.

3) After first week, personalised emails were sent to each of the 219 sample respondents of the three strata. The email contained a brief summary of the study, and a respondent information sheet and provided the weblink to the survey. 23 emails bounced, 19 of the email recipients had further queries, and 2 email recipients advised that they would not respond to the survey as there were no regional ports in their areas.

4) After third week, the first reminder was sent via a bulk email from the SurveyMonkey server using email collectors. A second reminder was sent by email collectors after fourth week. All reminder email messages contained the survey link and a remover link with the following sentence: 'If you have already completed and submitted your questionnaire, then please disregard this email'. To capture the respondents' attention, the subject of the email reminders were paraphrased each time keeping the main theme of the subject unchanged.

5) Just two days before closing all collectors and the survey, a final reminder was sent at the end of the fifth week. The web survey data collection ended two days later.

5.5.3 Data analysis

In this quantitative strand, in addition to data display and data transformation, data analysis involved analytical phases such as data correlation, data comparison, and data integration (Tashakkori & Teddlie 2003a). A mixture of descriptive and inferential statistical methods was used to analyse data in this strand. Descriptive statistical analysis and inferential statistical analysis including an exploratory factor analysis followed by a confirmatory factor analysis (Gaskin 2013d; Teddlie & Tashakkori 2009) were conducted. Data were displayed using tables, graphs, and charts.

The data correlation and data comparison respectively involved relating and comparing quantitative data with the qualitative data in the process of integration (Greene, Caracelli & Graham 1989; Onwuegbuzie & Teddlie 2003). Effect matrices, comparison tables, and graphs were used to aid data correlation and data comparison. The expansion of the notion of Australian regional ports' strategic role in regional development took place mostly in data interpretation through data integration (Greene, Caracelli &

Graham 1989). Data integration involved presenting data of both strands as a coherent whole (Onwuegbuzie & Teddlie 2003). Cross-tabulation of the findings of both strands was done during analysis to integrate data.

Teddlie and Tashakkori (2009) state that inference 'creates an understanding on the basis of all results, a whole that is bigger than a simple set of isolated conclusions made on the basis of different findings of a study' (p.288). In drawing inferences, integration plays a vital role in comparing, contrasting, consolidating, modifying, infusing, building, embedding, and linking one type of conclusion with another (Jang et al. 2008; Teddlie & Tashakkori 2009). Triangulation, complementarity and expansion through data integration remained the focus of inference drawing process (Erzberger & Kelle 2003; Tashakkori & Teddlie 2003b). Inference is not limited to answering research questions; rather it helps to develop new understandings and explanations (Teddlie & Tashakkori 2009). In this mixed methods research, various degrees of triangulation, complementarity and expansion occurred in drawing inferences. Figure 5.4 shows the process of reaching inference in this research. Ensuring inference quality in mixed methods research is crucial as it illustrates the advantage of using this method (Teddlie & Tashakkori 2003).

5.5.4 Reliability and validity in quantitative strand

In quantitative research, reliability refers to the proportion of variability in measured values due to the variation in true value; while validity refers to the extent of representation and measurement accuracy (Roberts, Priest & Traynor 2006). In quantitative research, validity falls into two broad categories: external validity and internal validity. Reliability is treated as the property of a research instrument that indicates its ability to produce consistent scores (Hammersley 1987). Reliability and validity are the keys to ensuring data quality in mixed methods research. Inference quality is also dependent on the data quality, because research findings based on quality data produce quality conclusions (Teddlie & Tashakkori 2009).

To ensure the reliability of the quantitative strand of this study, the internal consistency of items of a research tool ensures reliability in quantitative research (Bryman 2008; Cooper & Schindler 2011).

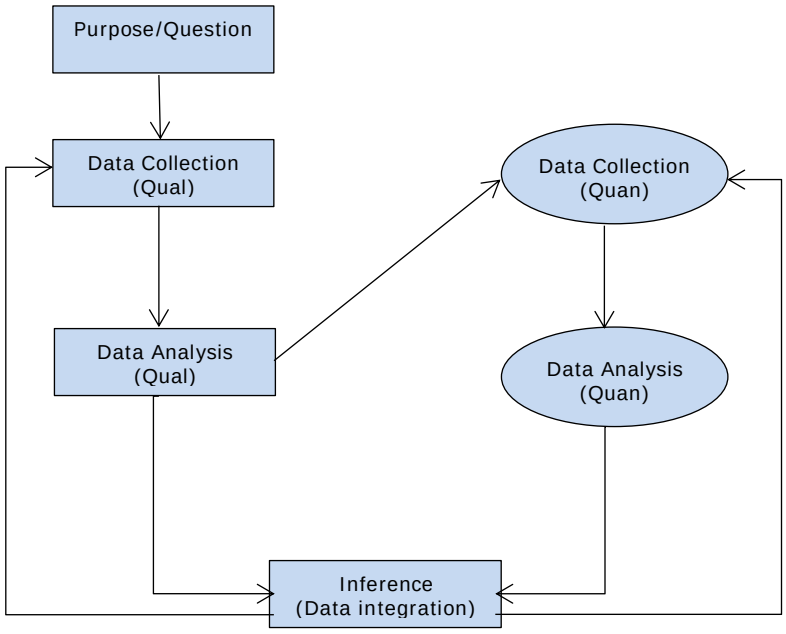


Figure 5.4: The process of reaching inference

Source: Tashakkori and Teddlie (2003b, p.688)

Cronbach's alpha coefficient was used to assess the internal consistency of the survey instrument (Creswell 2012; Cronbach 1951; Roberts, Priest & Traynor 2006). The composite reliability (CR) was reported (see section 7.6.1, Tables 7.24 and 7.25) during the confirmatory factor analysis (CFA) (Hair et al. 2010).

To ensure the validity, the following were concerned.

1) The survey instrument was prepared based on the interview outcomes and literature review on port-region relationship and regional development. The literature review covered the issues from different parts of the world; thereby addressing the external validity, construct validity and generalisability of the quantitative strand.

2) The pre-test participants, consisting of academics and professionals, were asked to comment on the content of the questionnaire, the wording and the scale of the items. These steps enhanced the content validity of the survey instrument.
3) The stratification and adoption of entire sampling frame as samples for data collection enhanced the internal consistency of this strand.
4) Since the development of the survey instrument did not follow any similar validated instrument, criterion-related validity checking was not possible (Roberts, Priest & Traynor 2006). However a rigorous scale construction process was adopted emphasising the use of multiple items to capture the breadth of a construct/variable.
5) The convergent and discriminant validity were reported during exploratory factor analysis and confirmatory factor analysis (detailed discussion is in sections 7.5.7 and 7.6.1). The results of factor analyses also illustrated the construct validity of the instrument (Bryman & Cramer 2004; Roberts, Priest & Traynor 2006).

5.6 Bias management and error control

Management of bias is important throughout the research process to ensure the quality of the research. Bias occurs during presentation of findings and report writing (Creswell 2012). Rudestam and Newton (2001) emphasise the importance of maintaining ethical issues for bias-free report writing. Zikmund et al. (2010) suggest researchers remain independent and personally detached as a way of managing bias. In this research, bias could occur when using certain language in the telephone interviews, and it could occur during instrument development or when reporting outcomes or drawing inferences. The following steps were taken to reduce bias:

1) Being ethical throughout the research process, including during data analysis and when reporting findings (Rudestam & Newton 2001). The researcher was careful for not to pass any experience, beliefs, and judgments during telephone interviews. The interviews were also recorded and transcribed for data analysis and final inferences (Creswell 2012).
2) Avoiding use of sensitive and offensive language. For example, using gender-neutral words and phrases for gender-biased words, using designations in parallel fashion, and avoiding language that suggests judgment or reinforces stereotypes (Rudestam & Newton 2001).
3) Acknowledging the participants, and practicing bracketing which means to remain suspended to pass any experience, beliefs, and judgments during telephone interviews (Roberts, Priest & Traynor 2006; Teddlie & Tashakkori 2009).
4) Using appropriate research terms (Creswell 2012).
5) Pre-testing of the telephone interview questionnaire and survey questionnaire, important checkpoints in bias management.

5.6.1 Sources of error and error control measures

Error control is crucial in ensuring overall research quality and authenticity. Dillman (2000) and Groves (1989) state that four types of errors can occur in research: coverage error, sampling error, measurement error and non-response error. In order to conduct an effective survey, Salant and Dillman (1994) suggest several basic preventive measures as follows:

- Having a comprehensive sampling frame to decrease coverage error
- Selecting a sample as large as possible to reduce sampling error
- Using an unambiguous and well-planned instrument (questionnaire) to reduce measurement error

- Using rigorous and persuasive administration procedures to reduce non-response error

The error control measures for this research are discussed below.

5.6.1.1 Coverage error control

Coverage error results from when a sample does not include all elements of the target population (Salant & Dillman 1994). In order to draw a sample that includes all elements of the target population, this research prepared a comprehensive sampling frame of the target population. Updated information was used to prepare a sampling frame in both strand (Dillman, Smyth & Christian 2009). Missing, ineligible or duplicate entries were eliminated from the sampling frame (Salant & Dillman 1994).

5.6.1.2 Sampling error control

Sampling error occurs when a sample (a subset) is drawn from the target population (sampling frame) instead of taking the entire target population into consideration (Dillman, Smyth & Christian 2009). It is impossible to estimate sampling error in non-probability sampling techniques (Salant & Dillman 1994). In the qualitative strand of this research, the initial list of participants (pilot sample) for the purposive snowball sampling was prepared in consultation with a small number of experts and officials. In the quantitative strand, the comprehensive list-based sampling frame for the web-based survey included all possible samples in three strata. These three strata increased the visibility of the sampling frame. The entire list-based sampling frame was later adopted for data collection to reduce sampling error.

5.6.1.3 Measurement error control

Measurement errors result from inaccurate, imprecise or non-comparable answers by the survey respondents. This can be due to the survey method choice, questionnaire format, investigator's error, or respondent's error

(Salant & Dillman 1994). The following steps were taken to reduce measurement errors:

1) Two different data collection methods were used in this exploratory sequential design of mixed methods research, which provided opportunities to balance between the strengths and weaknesses of the data collection methods that controlled measurement error. The choice of these methods directly matched with the purpose and procedural objectives of this research. The semi-structured telephone interviews in the qualitative strand explored the issues and the web-based survey in the quantitative strand investigated the extent of the issue.
2) A simple web-based questionnaire using very basic html codes ensured a consistent look and enhanced user-friendly characteristics, irrespective of respondents' computer set-up. Unambiguous questions, correct question order and scale, and presenting questions in a similar context were ensured, to reduce measurement errors (Cooper & Schindler 2011; Dillman, Smyth & Christian 2009; Salant & Dillman 1994).
3) An invitation letter or email, an information sheet and a consent form were provided to each participant to avoid measurement error (Dillman, Smyth & Christian 2009; Punch 2006).

5.6.1.4 Non-response error control

Dillman (2000) and Salant and Dillman (1994) illustrate that non-response errors are a problem when two situations hold true at the same time:

- When a significant number of participants do not respond, and
- When non-respondents have different characteristics from respondents, where these characteristics are crucial for the study.

The port stakeholders concept (Notteboom & Winkelmans 2002) were the main characteristics of the samples for data collection in this research.

Rigorous administration of data collection procedure reduced non-response. The following steps were taken to avoid non-response in this research:

1) The selection of purposive snowball sampling in the qualitative strand and list-based stratified purposeful sampling in the quantitative strand were to ensure responses from appropriate information-rich participants with a reasonable response rate.
2) Introductory letters were sent and follow-up telephone calls were made before conducting the telephone interviews in the qualitative strand. A self-explanatory email and three reminders were sent to the respondents before closing the web-based survey collectors in the quantitative strand. These steps helped to increase response rates in both strands.
3) In the qualitative strand, the participants were contacted by telephone to ensure that they were the actual individuals. In the quantitative strand, the key port stakeholder associations or councils were informed about the survey before sending email invitations to the respondents. This helped to create an enabling environment for the survey and enhanced the representativeness of the respondents.

5.7 Summary

This chapter has discussed the methodological decisions for this research. A pragmatic paradigm with an exploratory sequential design of mixed methods approach has been recommended to address the research problem. It has been found that the views of various Australian regional port stakeholders need to be considered to address the research problem. The pragmatic paradigm's pluralistic and consequence focused nature best suits the sequential data collection, analysis and interpretation and underpins the decision of using mixed methods in this research.

Using telephone interviews, the qualitative strand (phase one) has been designed to explore the perspectives of Australian regional ports' key stakeholders in regional development. The quantitative strand (phase two) has been assigned to validate a web-based survey instrument. The quantitative survey instrument is intended to investigate further the Australian regional ports' strategic initiatives to be better involved in regional development. The results of the empirical study through these two research approaches will be presented in the following two chapters.

CHAPTER 6: QUALITATIVE RESULTS

6.1 Introduction

The previous chapter described the mixed methods research methodology used in this study. This chapter reports and discusses the empirical findings of the qualitative strand of the study, aiming to answer the two research questions (RQ 1 and RQ 2) of the qualitative strand stated in chapter 5, shown below:

> RQ 1: How are Australian regional ports currently involved in their host regions?
>
> RQ 2: What is the scope for Australian regional ports to be involved in regional development?

The chapter begins with an analysis of the demographic information of 38 semi-structured telephone interviews, and then presents the port stakeholders' perspectives on ARP's role in its region, and addresses issues challenging ARPs. The chapter then examines the scope for Australian regional ports to be involved in regional development and presents a conceptual model. The conceptual model will be further investigated in the quantitative strand (second phase) through a web-based survey, therefore the final part of this chapter explains the development of the survey instrument (questionnaire).

6.2 Characteristics of the telephone interview

A snowball sampling technique was used to locate participants and to explore their views about the research topic. The telephone interview process was stopped when sufficient information (saturation of information) was obtained from the participants.

For this semi-structured telephone interview, the topics and issues were outlined beforehand (Teddlie & Tashakkori 2009). Based on the literature review, two questionnaires consisting of 10 and 8 questions respectively were prepared for interviewing port officials (internal port stakeholders) and external/other port stakeholders. Four short summary questions (yes-no, binary scale) were asked at the end of each interview (see Appendix C for questionnaires and short questions). The questions were intended to answer the two research questions (RQ 1 and RQ 2) which explore Australian regional ports' involvement in their regions.

The significance of the research area was endorsed by the participants in the telephone interviews. Two participants commented on the research topic as follows:

> *Now I assure you that the subject you are dealing with is pretty close to our heart.-TIP (Telephone Interview Participant) #13*

> *I think it is an absolutely critical piece of research. …….If you provide a research base for that debate, our nation will be much better served……. that's why I am giving my precious time to you.*
>
> *-TIP (Telephone Interview Participant) #08*

6.2.1 Demography of telephone interview participants

In the semi-structured telephone interview process, the participants' profiles were influenced by the snowball sampling technique. As the research focuses on strategic issues, people holding high positions in their organisations were chosen. The 38 telephone interview participants were senior managers, either from Australian regional ports, or from organisations that are port stakeholders.

Table 6.1 and Figures 6.1 to 6.3 illustrate the profile of the participants. In this study, 20 (53%) participants were internal port stakeholders directly involved in Australian regional ports (ARPs) and the remaining 18 (47%) were external (other) port stakeholders. 50% of participants were either CEO or equivalent. 53% had more than 10 years' experience working in their respective fields, while 24% had 6 to 10 years' experience. These experienced and high ranking officials as telephone interview participants enriched the data quality and provided a better approximation scenario for generating a conceptual model for ARPs involvement in regional development.

Of 19 interview participants of Chief Executive Officer (CEO) or equivalent professional level, 12 were from Australian regional ports (internal port stakeholders) and 7 were from other regional organisations (external port stakeholders) such as regional development agencies, shire council, rail organisation and shipping association. Of those at General Manager or equivalent professional level, both groups of port stakeholders had 5 participants each. In the category of Harbour Master or Business Development Manager, 3 participants were from ports and 6 were external port stakeholders.

Figure 6.3 illustrates the State or Territory representation of the telephone interview participants. A total of 4(11%) participants were from the Australian Capital Territory (ACT). They worked for federal government agencies and central shipping, port or ship owners' associations. No participant from port was involved due to the fact that the ACT does not have any regional port. Queensland (QLD) and Northern Territory (NT) have 6(16%) and 2(5%) participants respectively, who are all port officials (PO). There were 4(11%) participants from Victoria, and 6(16%) from Western Australia. South Australia (SA) has the lowest representation 2(5%) which may be due to the fact that most regional ports in SA are under the umbrella of Flinders Ports Pty Ltd.

Table 6.1: Profile of the telephone interview participants

Classification	No. of port official participants	No. of external port stakeholder participants	No. of total participants
Designation:	-	-	
Chief Executive Officer (CEO) or Equivalent	12	7	19 (50%)
General Manager (GM) or Equivalent	5	5	10 (26%)
Harbour Master (HM) / Business Development Manager or Equivalent	3	6	9 (24%)
Total	20 (53%)	18 (47%)	38 (100%)
Experience:	-	-	
Over 10 years	10	10	20 (53%)
Within a range of 6 to 10 years	4	5	9 (24%)
5 years or less	6	3	9 (24%)
Total	20	18	38 (100%)
State / Territory:			
Western Australia (WA)	3	3	6 (16%)
South Australia (SA)	1	1	2 (5%)
Victoria (VIC)	3	1	4 (11%)
New South Wales (NSW)	4	3	7 (18%)
Queensland (QLD)	6	0	6 (16%)
Northern Territory (NT)	2	0	2 (5%)
Tasmania (TAS)	1	6	7 (18%)
Australian Capital Territory (ACT)	0	4	4 (11%)
Total	20	18	38 (100%)

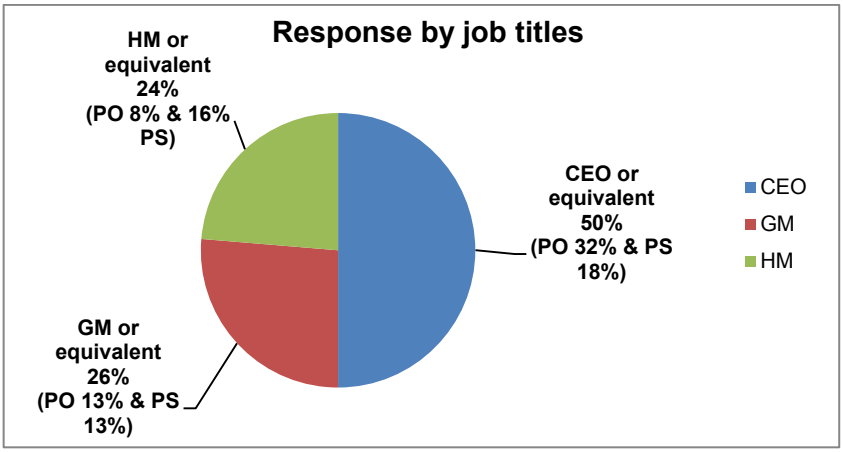


Figure 6.1: Response of the participants by job titles

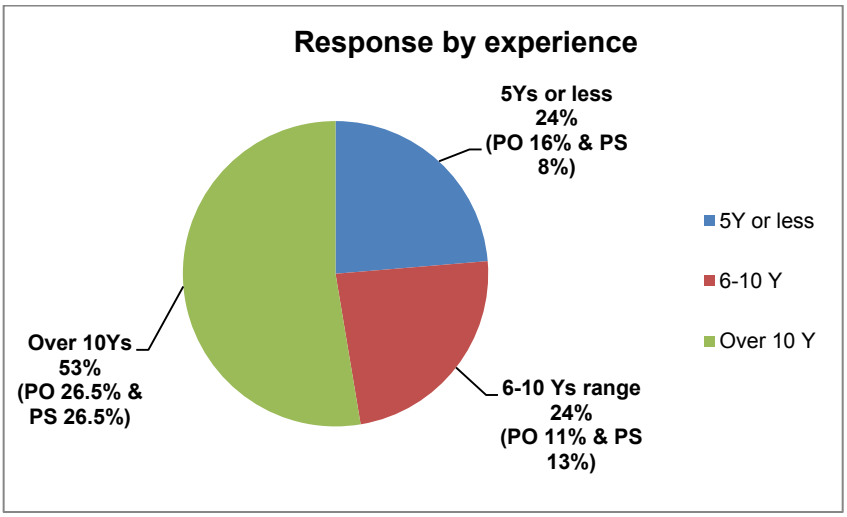


Figure 6.2: Response of the participants by years of working experience

Tasmania and New South Wales (NSW) have the highest representation 7(18%) each. As the research is based in Tasmania, this may have influenced the representation for the state. Tasmania may also have attracted the attention of the port officials and port stakeholders as the State's regional ports are struggling to generate sufficient volume; direct international shipping is being reduced and interstate shipping remains expensive.

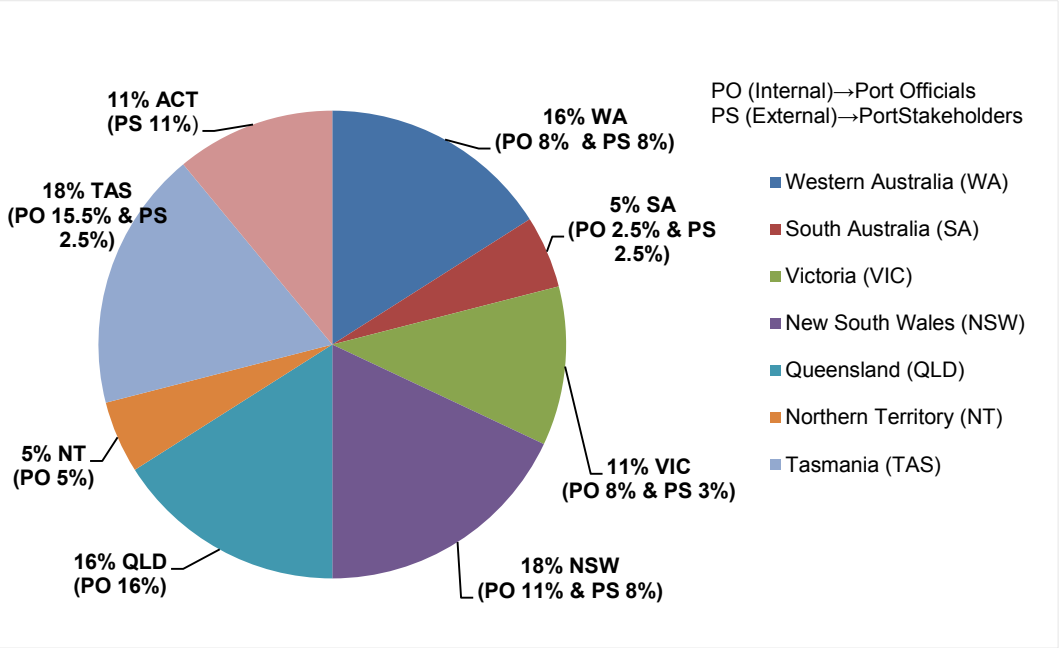


Figure 6.3: State and Territory representation of the participants

The average interview durations with port officials and external (other) port stakeholders were 40 minutes and 39 minutes respectively. Initially, it was intended to limit the interviews to 30 minutes, but 79% of the interviewees chose to talk for more than 30 minutes. Only one interview was finished in exactly 30 minutes and 18% of the interviews took less than 30 minutes. Further demographic information on the telephone interview participants including the duration of interview is shown in Table E-1 (Appendix E). 51% of the total interview time was spent engaging with participants at a level of CEO or equivalent. The rest of the interview time (49%) was spent with participants who were General Manager (GM), Harbour Master or Business Development Manager and equivalent.

6.2.2 Results of summary short questions

At the end of each interview, four summary short questions with a binary scale were asked to interview participants. The result is summarised in Table 6.2. In general, the majority of participants (97%) thought ARPs have contributed in regional development. Also, 95% of the participants considered that there is a necessity for ports to be involved in regional

development and regional innovation system. Nonetheless, only 84% thought that a port can play a leading role for regional innovation while 11% and 5% did not think so and was not sure respectively. Of interest, only 66% of the interviewees thought that their ports in the region maintain sufficient societal and community relations. The results of these short questions will also be used in the discussion of findings from qualitative data in sections 6.5 and 6.6.

Table 6.2: Telephone interview participants' responses to four short questions

Short question	Yes	No	Not sure
1. Do you think Australian regional ports contribute in regional development?	37 (97%)	1 (3%)	0
2. Do you think that a port can play a leading role for regional innovation in which it is embedded?	32 (84%)	4 (11%)	2 (5%)
3. Do you think that the port in your region maintains sufficient societal and community relations?	25 (66%)	12 (32%)	1 (2%)
4. Do you think that there is a necessity for ports to be involved in regional development and regional innovation system?	36 (95%)	2 (5%)	0

6.3 The definition of Australian regional ports

Although the term 'Australian regional ports' (ARPs) is frequently used, the definition of ARPs is indistinct and complicated because of the differing views on what constitutes a regional port. The difficulty in defining ARPs arises from the differences in ports locations, hinterlands, city-port proximity, cargo patterns, local demands, linkages with other transport infrastructure and distance from the community. Although some of the participants (TIP08, TIP13, TIP35) believed that a definition for ARPs is not essential, as it does not restrict port and regional development, a uniform definition for Australian regional ports is required at least from a planning perspective. Three definitions for ARPs arose from the telephone interviews:

1) A regional port is a port that assists regional primary producers, helps importers of general cargo and goods for the region and allows mining sectors to operate smoothly. (TIP02)
2) A regional port means any port outside a capital city, regardless of the size of the port. (TIP13)
3) A regional port can be defined as a non-capital city port which facilitates business in the region in which it is situated. (TIP22)

The common features of these definitions are the regional orientation and service of the port for the region. This supports Vleugels (1969), who states that regional ports only handle goods imported into or exported from the port-region, the region whose economic dynamism is determined by the activity carried on the port. In the Australian context, the non-capital orientation of regional ports, as mentioned by the telephone interview participants, are not uniform. For example, Port of Darwin and Hobart are both situated in the state capital cities but are regarded as regional ports. In this context, an Australian regional port can be regarded as a port outside metropolitan cities serving regional businesses. This description of ARPs has been provisioned in the web-based survey questionnaire with other probable definitions and has been discussed further based on the quantitative data analysis in chapter 7 (section 7.4.3.1).

6.4 The thematic analysis of the qualitative data

A thematic analysis was performed with the qualitative telephone interview data. The flow of data analysis is shown in Figure 6.4.

The N Vivo 10 software, supplemented with traditional manual approach, has been used for building codes and developing main themes. The purpose of codification and theme building were to generate a conceptual model for ARPs' involvement in regional development (the model has been discussed in section 6.6.4). Five nodes, such as port-region relationship, regional development and ports, ports' current issues, ports'

proactiveness in engaging with regional businesses, and ports and regional innovation, have been used to arrange transcripts in N Vivo for content analysis and thematic analysis. These nodes emerged during the related processes of literature review and semi-structured telephone interview questionnaire preparation.

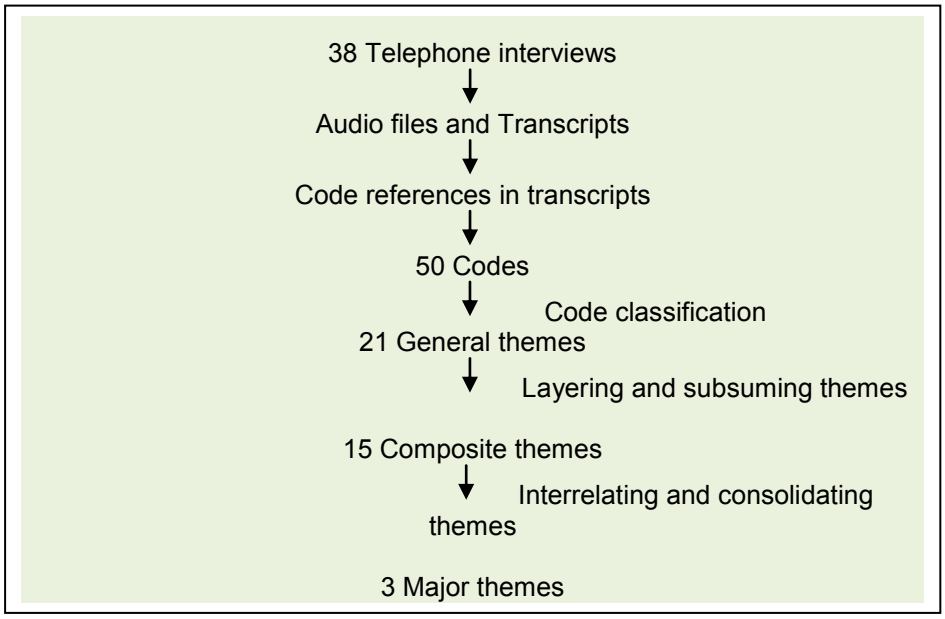


Figure 6.4: Telephone interview data analysis flow

The details for codes, themes and theme development process are presented in Tables and Figures in Appendix F. The code references were marked in the paragraphs and codes were identified and named in the transcripts oriented in five nodes in Nvivo. Code frequency, word or text query, code co-occurrence matrix by participants and code similarity or co-occurrence matrix were used to identify general themes, composite themes and main themes (Namey et al. 2008). Code co-occurrence is a scenario where two or more codes appear in a discrete section of text. This illustrates the distribution of thematic domains beyond normal frequencies within the overall data set (Namey et al. 2008). Analysis of the theme development as revealed during the telephone interviews is presented in Table F-1 and Figure F-1. Based on responses from the

telephone interview participants, the codes were classified into general themes. The general themes were layered to form composite themes and the composite themes were further consolidated to generate major themes.

The range of codes across the nodes is illustrated in Table F-2 (Appendix F). The code frequency shown in this analysis indicates the significance of a code in identifying a theme. The interview participants by codes and the code co-occurrence or aggregated code similarity matrix by value are presented in Table F-3 and F-4 respectively. Some important 'text query' results from N Vivo that facilitates code and theme development are also shown in Table F-5. Overall, these indicate the spread and relationship between the codes, which helped to identify the similarity among codes (Guest & McLellan 2003). They also express the concentration of codes and the inter-linkages among codes in the theme building process.

The general telephone interview findings are reported in the next section according to the five nodes. Alpha-numeric notations have been used where 'TIP' stands for 'Telephone Interview participant', 'C' stands for 'Code', 'GT' stands for 'General Theme', 'CT' stands for 'Composite Theme' and 'MT' stands for 'Major Theme'.

6.5 Stakeholders' perspectives on ARPs and regional development

Based on the semi-structured telephone interviews, this section analyses and discusses the perception of ARP stakeholders on a regional port's role in regional development.

6.5.1 Port-region relationship

This section is based on the answers to questions 1 and 2 in the questionnaire for port officials and external port stakeholders (see Appendix C). The questions are focused on port and region relationship highlighting port activities which contribute to region and regional

development, and port's relationship with community, regional businesses and entities. The interview data revealed that although the relationship between a regional port and its region varies from port to port, in general Australian regional ports act as a gateway for export and import in the region (C15). This relationship needs to be strengthened in various ways, by enabling regional economy (C17), having enhanced community engagement (C1, C2, C3, C8), being strategic in planning for port and region (C4), and in developing partnerships for supply chain integration (C23, C25). In this context, Australian regional ports are important links between the region and the marketplace.

As a trading nation, import-export is the backbone of the Australian regional economy. Regional ports are critical conduits for their regions because they assist in exporting regional primary products and resources, import cargo for local demand, and allow resource sectors to operate smoothly (TIP02, TIP23, TIP35, TIP38). Regional ports are major employers in their regions, and have a significant effect on regional economy (TIP01, TIP02, TIP04, TIP08, TIP11, TIP13, TIP18). The services provided by ports have an immense impact on the competitive advantage of regional products (C11, C13, C17, C23). In addition, the growth and sustainability of regional ports are very much dependent on providing customer focused services (TIP06, TIP11, TIP35, TIP38) and the development of the regions concerned (TIP12, TIP17). Therefore, the support of the community and stakeholders is critical for port growth. Table 6.3 shows some of the activities undertaken by ARPs which have contributed to improving societal and port-region relationships.

Building community confidence in port activities is critical for the port-region relationship and port development (Reynolds 2011). As indicated in Table 6.2 (section 6.2.2), the participants' responses to the third short question related to this issue showed that 66% (17 port officials and 8 external port stakeholders) of the interview participants stated that ARPs

maintain sufficient societal and community relations, whereas 34% (3 port officials and 10 external port stakeholders) concluded that ARPs did not have sufficient societal and community relations.

Table 6.3: Port activities contributing to port-region relationships and regional development

Telephone interview participant code	Port activities
TIP # 34, 13, 08	Regular dissemination of port information
TIP # 01, 34	Community involvement through port's community liaison committee
TIP # 06, 22	Sponsorships for community activities, environment, sporting, and in some regional businesses
TIP # 01	Maintaining sister-city and sister-port relationship with other country's city and port
TIP # 02, 38	The port performs as a partner of the government led economic council or zone or triangle
TIP # 04	Port provides funding to local authorities to build community infrastructure such as sewage treatment plant
TIP # 05, 19, 32, 31	Providing avenue and information on export-import for regional businesses
TIP # 05	Providing fuel supply for remote regions
TIP # 06, 22	Port has local buy policy which is mostly followed in case of labour employment
TIP # 38, 22, 13, 08	Managing amenity impacts to integrate port with the city

The majority of port officials asserted that community involvement of ports was sufficiently met through community liaison committees, which work with the community and disseminate port information. However, external port stakeholders described community involvement as 'not adequate enough'. For example, the regional resource ports look at community involvement as 'not an essential task' as the community of these ports is located at a relatively long distance from the ports.

One of the participants (TIP13) called regional ports 'economic enablers or strategists' for the region, because they are pro-active in management, planning and development of supply chains as active strategic partners in region and assist in developing regional economies and gaining regional competitive advantages. ARPs usually have representation in local

development organisations, regional councils and local chambers of commerce, which provide them with opportunities to act as economic strategists. In doing so, regional ports ensure that they are considered in any planning for regional development.

Two of the interviewees from government agencies (TIP08, TIP13) described regional ports as objective stakeholders in the supply chain, because they must ensure the efficient performance of the overall supply chain, not just the port. This concept has also been encouraged under the Federal Government's National Port Strategy. However, few port officials (TIP11, TIP35, TIP38) expressed an interest in demand based integration of the supply chain. This is a commercially driven plan for developing partnerships within the existing supply chain as well as generating new supply chains to connect businesses in the region (TIP38).

For the most part, the ARPs maintain community relations in order to build trust and networks among regional businesses. Building trust and networks through organisational activities enhances social capital, an important element for regional development (Cooke, Clifton & Oleaga 2005). Two of the port official participants (TIP04, TIP07) looked at social capital from a commercial standpoint, stating that anything a port does enhances social capital. They cited limitations of ports to enhancing social capital, such as lack of funding, difficulty in gaining planning approval, and lack of adequate authority. Three of the port stakeholder participants (TIP08, TIP25, TIP33) regarded social capital as an area for regional ports to be involved in regional development. The absence of a systematic approach to building social capital exists in the port region (CT4).

6.5.2 Regional development and ports

This section is based on the answers to questions 3 and 4 of the port officials' interview questionnaire and question 3 of the external port stakeholders' interview questionnaire. These questions were intended to

elicit port stakeholders' perspectives on whether ARPs are involved in regional development and the factors driving for regional development.

Australian regional ports are region-centric organisations which provide infrastructure services and handle regional commercial demands. They are usually situated in pastoral or resource dominated areas (TIP02). The infrastructure provides impetus for regional development (Pratte 2012; Rietveld 1989). The port infrastructure should adopt a proactive, holistic, regional strategy rather than simply be reactive and be limited to past practices (Baer 2009). The geographical position of Australian regional ports makes them important links for their regions in meeting the challenges of regional development (TIP01, TIP02, TIP38).

In reference to ARPs' contributions to regional development based on the interview participants' responses to the first short quantitative question, presented in Table 6.2, 97% (37 out of 38) of participants considered that the port activities contributed to regional development. They supported the Government's regional development programmes which bring mutual benefits to the ports and their regions. However, only 20% (4 out of 20) of the port officials stated that ports contribute to regional development, because it is not their core business and this should be the responsibility of other organisations in the region. In this regard, two port official participants (TIP02, TIP04) commented that a regional port can be involved in regional development from a lobbying level rather than a production level. The reasons behind these comments might be the lack of policy and legislative support or poor financial capability of ports. For example, one port official participant stated that the State's legislation does not allow ports to play an active role in power generation (TIP 02).

In regard to ports' involvement in different aspects of regional development, 76% of the participants stated that ARPs are involved in serving regional customers, stakeholders, and communities in a number of

ways, for example in economic, social, environmental and spatial dimensions. The interview data showed that regional ports' activities are focused on economic considerations (C15, C16, C17, C18), while the social dimension is partially addressed through ports' sponsorship programmes and corporate social responsibility (C2, C3). The environmental dimension is served through implementing environment upgrading projects as a part of corporate social responsibility and by creating buffer zones or adopting noise reduction measures (C3, C30). The spatial dimension (C4, C27, C29) is addressed through representation of ports in regional resource utilisation committees, chambers of commerce and by implementing specific port expansion projects to meet regional demand.

Table 6.4 presents the regional development factors in Australia as expressed by the two interviewee groups, that is, the port officials and other/external port stakeholders. Four participants (TIP03, TIP05, TIP24, TIP34) indicated that the manufacturing bases of the regions are declining, as well as other industries such as tourism and cattle. Regions are moving toward developing the resource base including offshore industry.

Table 6.4: Participants' perspectives on regional development factors

Port officials' perspectives	External/Other stakeholders' perspectives
• Transport infrastructure efficiency connecting the port • Connectivity of port with road and rail • Integration of port with the city and market • Research and development induced commercial framework of port • Consistent coupling between the port and resource sector • Port planning capability • Region supported port development • Port involvement in organisational collaboration • Port involvement in regional innovation	• Supply of energy • Access to cheaper power • Availability of water • Comprehensive network of both social and economic infrastructure • Capability to cope or adjust with bad weather • Enhancement of manufacturing base of the region • Competitiveness of regional products • Population growth and demand of population

It is important to utilise the growth of the resource industry to strengthen the bases of other region specific industries. Transport efficiency, including linking ports with other modes of transport and resource sectors, and integrating ports with cities and markets are prerequisites for sustainable regional development. The extent of involvement of ARPs in regional development varies from region to region because of the different characteristics of the regions. The ports' planning capability (C34), transport efficiency in connecting ports in the region (C30), port-centric organisational collaborations (C23, C25, C26, C27), and ports' position as a platform for the region (C11) are identified as crucial elements for their involvement in regional development.

6.5.3 Ports' current issues

This section illustrates the answers to questions 5 and 6 of the port officials' interview questionnaire and question 4 of the external port stakeholders' interview questionnaire. The interview results showed that Australian regional ports are facing a variety of issues which differ between ports due to their geographic location and distance from markets.

It was found that those regional ports serving mining or resource sectors are quiet detached from the community, and that rail connections to mines are not well coordinated. This is mainly due to the lack of investment, as capital requirements for mining are very different from the capital requirements for rail in terms of payback timeframe (TIP 02). Some mining companies are practicing a fly-in/fly-out approach for their workforce. This generates tensions in the region, as the development of housing, schools, and other services are important in creating a stable community. The results also reveal that the remote regional ports serving agricultural hinterland do not have a sufficient manufacturing base (TIP03, TIP11, TIP18, TIP34). This is mainly because those regions have a limited population, less demand, lack of innovation, inadequate port connectivity and poor transport infrastructure. The problems or bottlenecks around

Australian regional ports highlighted by the participants are presented in Table 6.5.

Table 6.5: Current problems of Australian regional ports

Type	Current problems
Management	Lack of financial power and authority
	Lack of flexibility in management
	Governance idealness in WA ports
	Lack of political will
	Lack of complete acquaintance of the regional setting
Operational	Dust and noise
	Lack of demand modelling
	Absence of transit cargo handling facilities
	Lack of coordination with rail
	Costly maintenance of port infrastructure including channel dredging
	Poor port efficiency
	Congestion
	Lack of accountability to community
	Absence of people in delivering expansion projects
Financial	Lack of investment in port infrastructure development or expansion
	Exorbitant port pricing
	Lack of source of funding options/ Difficulties in securing funds
Planning	Lack of planning capability and absence of long term planning
	Coping with container trade growth and new freight opportunities
	Delays in getting environmental approval of the projects
	Preservation and development of port access corridors
	Lack of visible management tool or assessment indicators
Entrepreneurial	Lack of leadership initiatives
	Absence of innovation
	Absence of sufficient societal and community relations
Spatial	Long distance from the market and the community
	Remoteness for establishing effective connectivity between ports and other transport modes and / or infrastructures
	Lack of cargo volume generated in the region / Absence of sufficient throughput / Poor internal demand of the regions due to less population density
	Land constraint and encroachment

A regional port is a perfect reference frame to demonstrate regional strengths and limitations (TIP03, TIP31). The interview results showed that most regional ports do not have a long term plan, but that they do consider regional strengths and weaknesses in their decision-making process. Nevertheless, those ports do not adopt the stakeholder management approach for strategic planning. In contrast, those regional ports having a long term plan have engaged with stakeholders to enrich the plan. They

adopt ‘communication’ and ‘consultation’ as the main tools for stakeholder management (C1, C7, C8, C22).

In the setting of declining manufacturing and agricultural sectors, the growth of the resource sector in regional Australia presents a great opportunity for regional ports. In order to seize regional opportunities, ports need to be well equipped to cater for the demands of the resource sector. They need to have an effective planning strategy, fast and flexible approval procedure, efficient workforce to implement the plans, and above all, the appropriate delegation of financial power and authority. In this regard, the comment of one participant is notable:

> *In reality, the managers of all ports are fairly constrained; they don’t have much flexibility in what they can do. They have limited autonomy and in effect they are like branch office managers for a large company.*
>
> *-TIP (Telephone Interview Participant) #05*

Insufficient inland transport infrastructure, lack of efficient connections between ports and other transport modes, and a long distance between ports and markets increase the total transport cost and decrease the competitiveness of regional products. The remoteness of regional ports and the absence of leadership initiatives among regional organisations can create a situation which discourages innovation. In addition to innovation, proactiveness and risk-taking are important elements of the entrepreneurial orientation of an organisation (Fox 2005). The lack of innovation in regional ports indicates an absence of entrepreneurial orientation, which in turn leads to a lack of organisational collaboration within the region.

In conclusion, it is evident that a regional port’s engagement with the port community and stakeholders is critical for the integration of supply chains and for efficient port performance. Ports should also maintain competitive

port charges, so that costs are not considered exorbitant by regional exporters and importers (TIP03). As part of a good governance model, port authorities should be given more financial and authoritative delegation, so that private sector participation in the port increases (TIP 05). The port governance model in a public domain is to ensure regional and community needs, however private sector participation in ports will enhance port efficiency (TIP06, TIP08). There is a requirement for a balance between public and private sectors in governing regional ports, which will create synergy in regional dynamics and will facilitate regional innovation.

6.5.4 Ports' proactiveness in engaging with regional businesses

This section is based on the answers to questions 7 and 8 in the port officials' interview questionnaire and questions 5 and 6 in the external port stakeholders' interview questionnaire. A proactive approach is critical for supply chain integration and organisational entrepreneurship for ports. The telephone interviews revealed that identification and utilisation of opportunities (C26, C27, GT15), gathering information from the region and stakeholders (C7, CT6), devising place-oriented measures (C31, GT11) and adopting a participatory learning environment (C4, C48, CT15) are required for Australian regional ports to be sustainable and proactive.

Regarding ports' involvement in collaboration with regional organisations or multi-stakeholders initiatives, one port official (TIP04) suggested cautious joint ventures with regional businesses where the ports' commercial interests are directly involved. Another port official (TIP18) suggested that ports should be involved with regional businesses only if it is related to transport or port oriented supply chain integration. They also suggested that ports' submissions to the Government regarding planning for the region, and port representation in local chambers of commerce, are important in maintaining engagement with regional businesses. Some port official participants (TIP12, TIP23, TIP28, TIP34) indicated that ports

participation in supply chain collaboration or in multi stakeholder initiatives may not only promote commercial interests, but will benefit regional businesses indirectly. The need for port competition and port sustainability will encourage ports to act proactively in supporting businesses and supply chain integration in the region.

Two port official participants (TIP 07, 22) were against joint venture involvement. The following comment from a participant explains the view:

> *We don't get involved in joint ventures and that frees us to move across all customer bases. Our job is to be very active in nurturing existing customers, learning [about] future customers, providing efficiency in the supply chain. It's a much cleaner way, to be able to move across all segments by not being involved in joint ventures.*
>
> *-TIP (Telephone Interview Participant) #22*

Further, they argued that participation in regional businesses through multi-stakeholder initiatives is not possible for a port as those businesses are usually non-core or non-maritime related, and can be operated by other experienced parties in the region.

Three external port stakeholders (TIP08, TIP25, TIP31) agreed that there are opportunities for collaboration which require proactive leadership in ports and other regional organisations. Two others (TIP03, TIP20) stated that there is little opportunity for collaboration between ports and other organisations, or it varies from place to place as the ports are situated in remote areas.

In general, external port stakeholder participants agreed with the view that a regional port can be involved in regional businesses and joint ventures, if necessary, which is reflected in one participant's comment:

> *Like any other business (…name of the port….) should try to maximize income and try to be sustainable for the future by playing a proactive role with the help of community, businesses, state government, and port stakeholders.*
>
> *-TIP (Telephone Interview Participant) #03*

The interview participants also provided various perspectives with regard to port involvement in business incubation activities, in other words helping businesses to establish themselves in the region. The opinions are summarised below:

1) The business incubation activity could provide an opportunity for ports to play a leading role in the region (TIP # 01).
2) Business incubation is possible but not directly (TIP # 06)
3) It is possible for ports to be involved in business incubation by offering incentives through favourable pricing for businesses in their infancy. The sustainability of these businesses might be in the interest of ports (TIP # 13).
4) If the businesses are directly related to port operations, the port can help them. For instance, a port might help mining companies in developing businesses when it is not possible to start a project in isolation (TIP # 38).

The poor financial ground of regional ports (C39) is the main reason for a mixed perception among port official participants about ports' involvement in joint or multi-stakeholders initiatives. The lack of policy support (C35), absence of financial delegation or authority (C37) and lack of entrepreneurial leadership in the region (C38, C40) may further explain this mixed perception.

Both groups of interview participants (80% of the port officials and 89% of external port stakeholders) agreed that there is a need for generation,

collection and sharing of information between ports and stakeholders. However, 56% of port stakeholders' also thought that ports did not provide sufficient information to the community and stakeholders. Regional ports should be involved in generation, collection and sharing of information in order to promote businesses in the region. Furthermore, ports need to take the community into their confidence and to remain focused on customers' demands. Information could be disseminated taking advantage of technological advancements. One port stakeholder participant outlined the information dissemination process of a port:

> *The CEO of the port regularly provides updates of port [activities] through interviews on local ABC radio. [The] port has a strong involvement with the community through its community liaison committee. [The] port should be given more flexibility and more latitude in making investment decisions. [The] port can play a leading role in information flow in the region.*
>
> *-TIP (Telephone Interview Participant) #01*

Another port stakeholder participant from the Government sector criticised information sharing of ports as follows:

> *Lack of leadership, lack of understanding of a port's importance within the region, poor management, lack of accountability, lack of financial reporting to the community are the major constraints of regional ports in Australia. There should be a single or even a couple of information technology systems across the country (in ports) that could have open access and be shared. In Australia, all ports have their own system and they are closed.*
>
> *-TIP (Telephone Interview Participant) #08*

The role of ports in regional initiatives (C7) and in the generation and dissemination of information (CT6) can assist ports in forecasting market

demands and planning for infrastructure. Australia is an export oriented island nation, and its regional ports play a leading role in the flow of information. An integrated open access information system for ports and their regions is a necessity for regional Australia.

6.5.5 Ports and regional innovation

This section is based on the answers to questions 9 and 10 in the port officials' interview questionnaire and questions 7 and 8 in the external port stakeholders' interview questionnaire. Regional innovation has a positive impact on regional development (Gawel 2013; Trond Åge et al. 2005). A systematic approach to regional innovation with an institutional framework is most effective for regional development (Mas-Verdu, Ribeiro Soriano & Roig Dobon 2010). Infrastructure provides incentives to regional organisations for innovation (Ketikidis, Zigiaris & Zaharis 2010). The innovative efforts of individual organisations in a region create the framework for regional development. In this context, the growth of a region and a port located in that region are complementary to each other, which in turn accelerates regional development. Chen et al. (2010) describe this as a symbiotic relationship between a regional port and its region, which makes a port pivotal in a Regional Innovation System (RIS).

84% (32 out of 38) of the interview participants agreed that an ARP can play a leading role in regional innovation (based on responses to the second quantitative short question presented in Table 6.2). It can support capability, innovation, and competitiveness in the regional network situation (C11, C12, C16, CT11). The RIS is perceived as the working framework to nurture the symbiotic relationship of the port and its region (C40, CT11, CT12). One port official participant made the following comment in this regard:

> *As the Port of (name of the port) is a multi-cargo port, handling 20-25 different commodities, it has a vision to nurture the symbiotic*

> *relationship with the region. All (port) stakeholders recognise the importance of each other within the socio-economic, geographic and environmental matrix of the region.*
>
> *-TIP (Telephone Interview Participant) #02*

Innovation is recognised as a strong part of the community (C9). Effective institutional arrangements, and proactive and participatory leadership for regional organisations, including regional ports, are critical to RIS (C40). The participants (TIP01, TIP02, TIP04, TIP05, TIP06, TIP30) suggested several ways in which ports could collaborate with local organisations to generate innovative ideas in the RIS. These included:

- focusing on a long term holistic perspective for RIS (C49),
- promoting common interests (C48),
- developing ports as knowledge hubs for regional economy (C18),
- helping skill development and training through educational institutions (TIP04),
- engaging with customers and the community (C50),
- involvement in housing projects particularly in resource dominated areas (TIP02),
- the use of solar energy (TIP01, TIP30),
- the provision of annual skin cancer check-ups for local people,
- assistance for schools (TIP05), and
- adopting a ‘buy local’ policy (TIP06).

Port devolution is important for innovation (Bryan et al. 2006). In European ports it has been found that a port with more private sector participation has a greater positive impact on regional employment (Ferrari et al. 2012). When the interview participants were asked about this view, there were different opinions. The participants (TIP02, TIP05, TIP11, TIP28, TIP38) from public ports felt that port ownership was not essential for ports’ engagement with their customers in generating innovative solutions. Two

private port participants (TIP06, TIP19) also thought that there was no difference between public and private sector owned ports. However, to be involved in an RIS, participants from external port stakeholders (TIP08, TIP13) suggested that regional ports may require port governance restructuring with more private sector involvement in ports. This was reflected in one comment as follows:

> *We are seeing an enormous amount of innovation coming in through the leadership of the new private owners of (name of three ports). But, most other ports lack innovation, drive and the desire to engage in regional innovation or regional development.*
>
> *-TIP (Telephone Interview Participant) #08*

It is notable that the terms 'regional innovation' and 'regional development' have been used in a complementary sense, which supports a positive correlation between regional innovation and regional development. The restructuring of the governance model by enhancing private sector involvement in ports can help create an environment of flourishing entrepreneurial and leadership capacity for Australian regional ports.

With regard to whether a regional port could play a leadership role in a RIS in creating a regional competitive advantage, the interview findings revealed a mixed perception among participants. The participants from ports which mostly serve resource sectors (TIP04, TIP15, TIP22, TIP24) believed that a port's ability to play a leadership role in a region depends on the rationale and location of the port, as the mining industry is a big player in the region. A port is an important player in the region, but not the most important player. A region relies on a range of activities supported by all sectors within it, and a port is one of them. Agreement among all supply chain members for supply chain integration is critical in achieving a regional competitive advantage. By delivering the skill base a port can

improve the standard of living in the region. One port official participant from a resource dominated region stated:

> *It is nice for a port to be involved in regional innovation and regional development activities. This greatly depends on the situation, rationale, and place of the port, but it is not a necessity.*
>
> *-TIP (Telephone Interview Participant) #04*

Port stakeholder participants (TIP08, TIP13, TIP25) from the government sector emphasised that a port's willingness to participate in the RIS should be reflected in its goals and objectives. They recommended that a regional port should be a network leader in the RIS. It is important to devise innovative measures for ports to lower port user costs and to make their operations efficient. Regional ports could also play a leading role in developing an information sharing network within the region. As stated by the port official participants (TIP05, TIP09, TIP23), information sharing without breaching or compromising client confidentiality is a key element in a network situation.

6.6 Scope of ARPs' involvement in regional development

The scope of ARPs' involvement in regional development is revealed as three major themes during the data analysis. The three major themes relating to Australian regional ports' role in regional development are: port sustainability, building collaborative advantage and active participation of ARPs in RIS (see the summary of theme building in Table F-1 in Appendix F). These themes are discussed below:

6.6.1 Port sustainability

Port sustainability refers to business strategies and activities that provide a balance between the current and future requirements of the port and its stakeholders, while protecting and sustaining human and natural

resources, and pursuing economic prosperity, environmental quality and social responsibility (Bailey 2009; Hinds 2008).

Sustainability provides a firm ground for a port to operate responsibly in the region. Like any other sustainable enterprise, port sustainability covers a triple bottom line, which includes social, economic and environmental aspects (Chen et al. 2012). These aspects of sustainability are interrelated and interconnected (Benefits-of-Recycling 2013; World Commission on Environment and Development 1987). An Australian regional port is embedded within an economy, and that an economy exists within society, and society exists within the sphere of environment. As an import-export gateway for the region, a port's sustainability is achieved through business practices which consider the region and its community. Economic aspect of port sustainability is vital for a port's business viability. Environmental aspect of port sustainability is achieved through protection of the environment through upgrading, minimising or internalising environmental externalities. Social aspect of port sustainability can be achieved by focusing on building social capital through ensuring community well-being.

By addressing the social, economic and environmental aspects of sustainable development (World Commission on Environment and Development 1987), a port contributes to regional development. This is illustrated in Chen et al.'s (2012) study of Australian regional ports as follows:

> *Sustainable development should provide overarching objectives for port development in non-suburban areas because of its role in regional economic development, its impact on the environment as well as the community (p.3)*

Interview outcomes showed that port sustainability is one of the major themes concerning ARPs' involvement in regional development (MT1). Figure 6.5 illustrates aspects of port sustainability. According to the

telephone interview participants, an appropriate public-private partnership is at the core of port sustainability. The composite theme CT5 (Balanced involvement of public-private partnership) reveals the necessity of public-private partnership for port sustainability in Australian context. In the backdrop of public sector's limited scope in providing sufficient port development fund, the private sector investment in port development in addition to port operation is increasing rapidly.

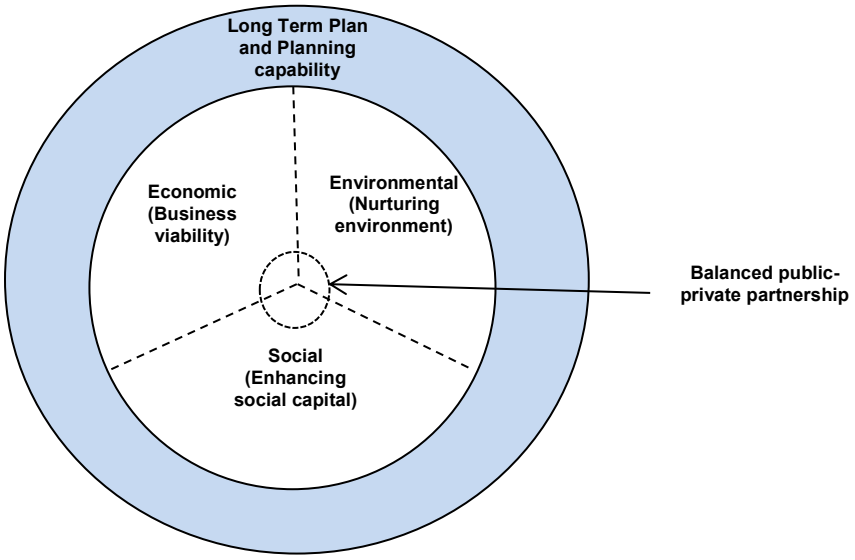


Figure 6.5: Port sustainability scenario for ARPs

The composite themes CT2 (Business viability & financial performance), CT3 (Enhancing environmental responsibilities of port) and CT4 (enhancing social capital) of the thematic analysis support the economic, environmental and social aspects of port sustainability. The interview findings showed that it is essential for regional ports to have a long term plan (CT1), as this is critical for port sustainability. However most Australian regional ports do not have long term plans. One of the telephone interview participants identified this issue as follows:

> *Our regional ports do not have long term plans; they do not link the port to road and rail networks; they do not have logistics chains*

> *organised. Most of our regional ports are poorly performing and poorly functioning in their own right and in terms of their land side and sea side logistics. [They] are not making profit; they are not financially sound…….how these ports be economic leaders and bring benefits and serve their regions...*
>
> *-TIP (Telephone Interview Participant) #08*

The lack of long term plans in some Australian regional ports may be due to poor port financial performance (C39). The planning capability of ports (C33, C34, CT1), the necessity of collaboration within the supply chain (C24, C25), a requirement of consultation and engagement with the community and stakeholders (C1), and a strong leadership in ports (C38) are also essential elements for formulating a long term plan. The benefits of long term planning are improved productivity outcomes, increased investment confidence and greater environmental protection (Ports Australia 2013a) which support port sustainability.

A port's economy is strengthened through its positive financial performance and by ensuring efficient supply chains. A strong port economy adds to the social and environmental wellbeing of the port-region. From an organisational perspective, long term planning is essential for port sustainability (Alman 2011). The National Ports Strategy identifies the need for long term planning in ports (Infrastructure Australia 2010b). Realising the benefits of long term planning in the overall regional and national development, Ports Australia recently released a general framework for port planning for ARPs (Ports Australia 2013a). This general framework is central to the requirement of having a general port governance framework in Australia, and to the improvement of the land use planning and corridor protection in and around Australian ports. To remain viable, it is essential for a port to update its long term plan (Baer 2009).

6.6.2 Building collaborative advantage

The term 'collaboration' means working together (Scott 2005). Collaboration as a management tool is always constructive, irrespective of its scope, form, or intensity, and concerns both informal relationships and close partnerships (Kozuch 2009). According to Himmelman (2002), the act of collaborating is more than networking (exchanging information for mutual benefit), coordinating (exchanging information and adjusting activities to achieve a common purpose), and cooperating (exchanging information, adjusting activities, and sharing resources to achieve a common purpose). It is characterised by cooperation, and enhances the capacity of separate parties to achieve a common purpose.

It is crucial to find ways of collaboration between organisations where participatory entrepreneurship is instrumental (Gray 1989 & Huxham 1996 mentioned in Axelsson & Axelsson 2006). Entrepreneurship is synonymous with innovation and is about creation of new businesses (Ahmad & Seymour 2008; Shahhosseini, Kavousy & Safariyan 2009). The extent of collaboration between organisations depends on their willingness to collaborate, the need for integration of function or structure among organisations, and the extent of involvement of different sectors (Axelsson & Axelsson 2006).

Building collaborative advantage with other organisations in the region is the second major theme of Australian regional ports involved in regional development. The composite themes underpinning this major theme include the ports' position as a network hub for the exchange of information among regional organisations (CT6), joint efforts for supply chain efficiency and capacity enhancement (CT7), sharing resources for collaboration (CT8), and policy support for collaborative activities and enhance public-private partnership (CT9). This indicates the participatory entrepreneurship of ports with other regional businesses. A port can be pivotal in encouraging collaboration among regional organisations.

An ARP's role as a network conduit (C13) is a critical prerequisite for any type of coordination, cooperation, and collaboration within a region (Himmelman 2002). That role needs to be enhanced, as ports do not collect sufficient information about the region in which they are located and demand modelling is not done properly (C31).

Exchange of information is the backbone for collaboration. The interview results identified information generation, collection, and sharing among the regional port stakeholders, regional organisations and businesses as key elements for collaboration (CT6). Exchange of information may also support the societal inclusion of ports in the region. Societal and community engagement may accelerate rapid and effective exchange of information, increase social capital and generate support for economic development in the region. Some of the Australian regional ports (TIP05, TIP09, TIP23, TIP34) have maintained a societal relationship with their regions through sponsoring social and community events, media releases and radio broadcasts, and participating in community liaison committees. However, the responses to the third short question in Table 6.2 showed that 32% of participants, most of whom were external port stakeholders, stated that regional ports do not maintain sufficient societal and community relations with their regions. This may be due to poor financial performance (C39), lack of leadership (C38), or high non-commercial demand by port stakeholders (TIP38). However, the regional resource-based ports did not think it important to maintain that relationship, as they considered themselves quite remote from society and the community (TIP04, TIP12, TIP18, TIP22).

The efficiency of supply chains is a joint effort among supply chain members, where ports can be a collaborative platform (C25). This was evidenced by the interview results as participants perceived ports as being 'objective stakeholders' for supply chain efficiency and coordination (C21), 'demand modellers' for port sustainability and planning (C31), and

‘economic strategists’ and ‘business catalysts’ for the region (C16, C20). Further, the increased cost of transport, due to rising fuel prices, has increased political pressure for better transport and logistics operations. This places ports in a position to play an important role in ensuring the efficiency of supply chains (SCR 2012). The collaborating platform should facilitate the exchange of information, sharing of resources, and should improve the capability of other organisations in the region to achieve a mutual benefit (Himmelman 2002). This mutual interest among regional organisations and port stakeholders would then be a driving force behind enhancing supply chain efficiency in the region.

6.6.3 The ARPs’ active participation in the RIS

Being an active participant in the regional innovation system (RIS) emerged as another major theme for Australian regional ports increasing their involvement in regional development. The underling composite themes are: entrepreneurship for regional innovation and competitive advantage (CT13); proactive leadership in ports (CT10); effective engagement with other regional entities for regional resource configuration (CT12, CT13); and utilising regional port’s position for interactive learning and knowledge transfer among regional organisations (CT11, CT15, C18).

The application of local knowledge and use of regional assets remain at the core of regional development strategies (Colletis-Wahl & Pecqueur 2001). As discussed in Chapter 2, the regional innovation system (RIS) is a systematic approach in a region, which acknowledges capability, innovation and competitiveness through the generation, use and dissemination of knowledge (Doloreux & Parto 2004). The relationship between regional organisations can flourish with the support of quality infrastructures, a pre-requisite for innovation (Cooke, Gomez Uranga & Etxebarria 1997). The activities of regional organisations remain a positive catalyst for regional innovation (Moulaert & Mehmood 2010).

Australian regional ports must cooperate with other organisations for their mutual interest and overall competitiveness of the region (C4, C9, C11, C47, C48). Regional competitiveness facilitates regional development, where shared leadership, institutional setup, infrastructure, knowledge and skills perform in a concerted way (Sotarauta 2005). The ARPs offer supportive infrastructure for production in regional Australia, and are tangible assets in regional development. The proactive and participatory leadership of ARPs can position ports as platforms for the RIS. 84% (32 out of 38 participants) of the interview participants agreed that ARPs should take a leading role in the RIS and 95% (36 out of 38 participants) thought its necessity for ARPs to be involved in the RIS and regional development (see Table 6.2). An Australian regional port is well placed to be familiar with the infrastructure, organisations, relationships and commercial objectives of businesses in its region. Proactive and participatory leadership by ARPs can help to promote regional innovation by evaluating regional strengths and weaknesses.

ARPs are regional focal points where import and export takes place for local businesses (C15). As a network point for the regional business (C12) the leadership role of ARPs can further be enhanced to support the RIS (Cahoon, Pateman & Chen 2013) in facilitating regional development activities. The symbiotic relationship between a port and its region, acknowledged by port stakeholders during the telephone interviews, supports ARPs' participation in an RIS. The port stakeholders also acknowledged the need to evaluate regional strengths and weaknesses when formulating port strategy. They recognised that ports have the necessary local knowledge, infrastructure, organisation, business relationships and commercial objectives to support businesses in the region.

The position of Australian regional ports at the centre of various networks in their regions puts them in a leading position for the regional innovation

system. Through their active participation in the RIS, ARPs can be the cornerstone for regional development as well as regional enablers and networking hubs for influencing regional competitiveness.

6.6.4 A model for ARPs' involvement in regional development

Australian regional ports are tied with their regions to as gateways for import and export of cargo. This relationship needs to be strengthened through enabling regional economy, enhancing community engagement, being strategic in planning with other regional organisations, and developing partnerships for supply chain efficiency and regional competitive advantage. A conceptual model for ARPs' contribution to regional development is presented in Figure 6.6.

ARPs are key interfaces between the region and the market through their supply chain networks. They can stimulate regional development by serving regional customers, communities, and port stakeholders, ensuring efficient port performance in the region, achieving collaborative advantage, and participating in activities related to regional competitive advantage.

Based on data analysis, the left side of the conceptual model indicates the roles of a port and the right side of the model describes the corresponding issues that need to be addressed for a port to be involved in regional development. The three hierarchies presented in the conceptual model are based on the interview findings which is the subject to further validation in Australian and international ports context.

This conceptual model is based on the notion of supervenience, where the possibility of reductionism, dependency relations, and multiple realisability form the basis of an argument (Miller 2003). Associated with reductionism are the hierarchical and nesting principles (Sober 1999).

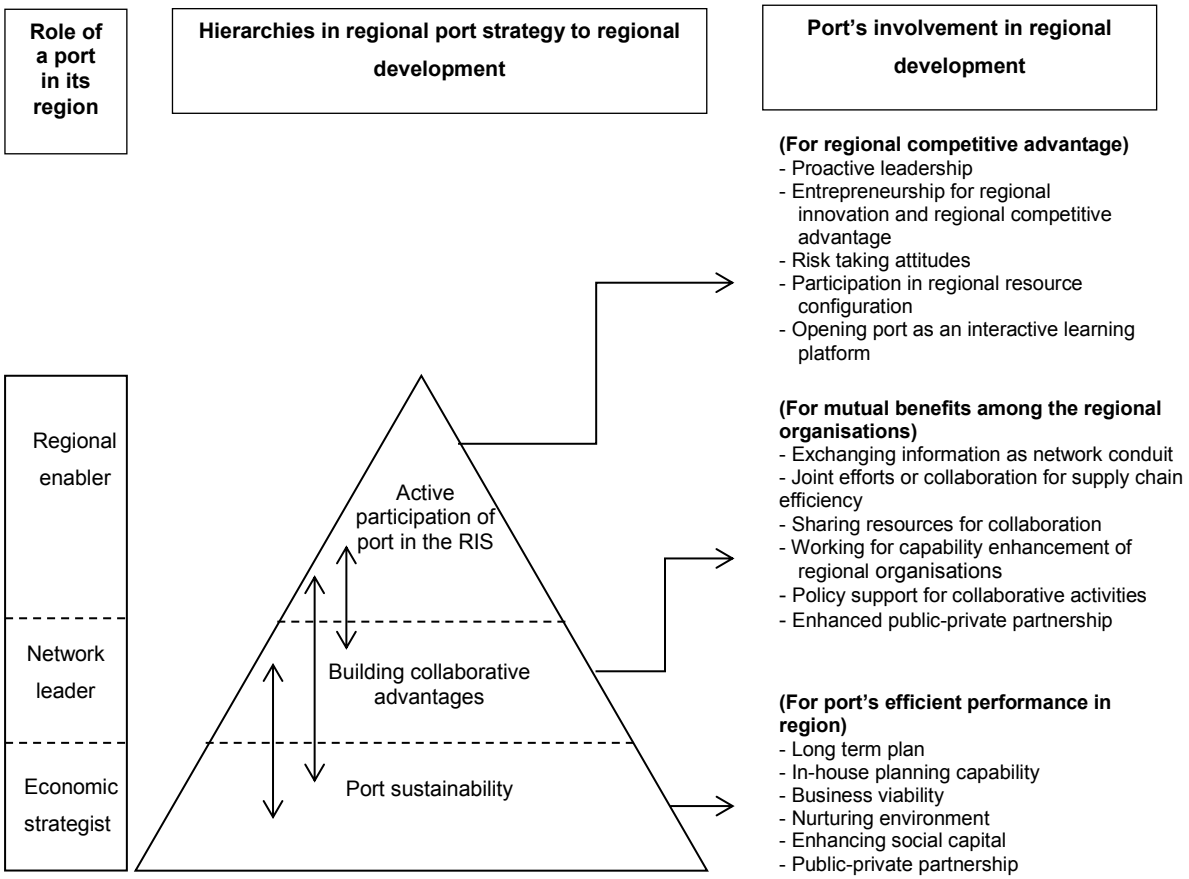


Figure 6.6: A conceptual model for ARPs' contribution to regional development

These principles are relevant to ARPs because the involvement of ports at a higher level (that is, active participation in the RIS) can reduce the involvement at lower level (that is, port sustainability). In other words, higher level involvement is a subset of lower level involvement. Whilst this involvement is not restricted to the ports' activities at different levels of the model, it implies the dependency relations among different levels. The concept of multiple realisability is also applicable for this model, as the higher level assertion can be explained depending on the lower level condition, while the lower level condition is not the only explanation (Sober 1999). The application of supervenience provides flexibility to the model

and encourages pragmatic thinking. A peer reviewed paper for 2013 IAME (International Association of Maritime Economists) Conference has been produced based on the data analysis of this qualitative strand (see Appendix I).

6.7 Instrument development

For the quantitative strand, a questionnaire was developed so that a web-based survey could be conducted. The process of developing this instrument was informed by the outcomes of the qualitative strand, including the conceptual model. The relevant literature was also used to support the questionnaire. The quotes/statements, codes, and themes from the qualitative data analysis were used in developing this web-based survey questionnaire.

A 'Gold' plan of the Survey Monkey online software was purchased to design and conduct the web-based survey. The 'Gold' plan was used because of its various features such as theme customisation, logo branding, opportunity to use Survey Monkey email manager, survey collection via weblink and email, enhanced SSL (Secure Sockets Layer) security, SPSS (Statistical Package for the Social Sciences) integration of data, and filtering and cross tabulation opportunities by custom criteria for data analysis (SurveyMonkey 2013).

A paper version of the questionnaire was produced (see Appendix G). The design of the web version followed the sequence, appearance and layout of the paper version. The questionnaire contains six sections (A – F) in eight pages, including a welcome page and a thank you page. An alpha-numeric label was assigned to each question in every section. Each section commenced on a new page with a clear section heading. The welcome page contained information on study title, anonymity, confidentiality, privacy, ethics and estimated time required to complete the survey. The thank you page acknowledged the contribution of the

respondent, and confirmed that a summary of the survey results would be provided to respondent upon request (Sue & Ritter 2007).

'Radio buttons' and 'Text box' have been used as techniques for responding (Selm & Jankowski 2006). Sequential navigational guides with an indicator of survey progress at the end of each page were used throughout the questionnaire, which made the survey easy to follow.

6.7.1 Developing the questions

Three types of questions were used in this questionnaire: matrix (one answer per row), multiple choice (one answer only) and text box. The matrix questions were chosen because they provide an opportunity to put several options/items with a single theme oriented question (Cooper & Schindler 2011; SurveyMonkey 2012). Multiple choice questions were used for collecting the respondents' demographic information, which supported data analysis through filtering and cross tabulation (SurveyMonkey 2012). Text boxes were used to allow respondents to provide additional information particularly for each section.

Section A of the questionnaire contained four questions which were based on the outcomes of the qualitative strand, emphasising the relationship between Australian regional ports and their host regions. The first question (A1) sought a definition for Australian regional ports. The items for this question (A1.1, A1.2, A1.3 and A1.4) were framed in accordance with the opinions expressed by the telephone interview participants, including the option (A1.5) to provide further feedback if necessary. Question A1 was of an exploratory nature, and set the tone of the questionnaire. The following three questions (A2, A3, and A4) were focused on the general characteristics of Australian regional ports, such as the quality of links with other modes of transport, the role ARPs play in region, and the nature of involvement in regional development. The items for these questions were based on the opinions of the telephone interview participants.

Sections B to E examined the conceptual model for Australian regional ports' involvement in regional development explained in section 6.6.4. These four sections each contained four questions, which focused on the three major themes illustrated in the conceptual model. For each question, an option labelled 'Other' was provided to allow respondents to make additional comments. Items B1.8, C1.7, C1.8, D1.7, E1.2, and E1.6 were adapted from relevant literatures (ESPO 2004, 2010, 2012a, 2012b; Fox 2005; Himmelman 2002) to reinforce and support the themes of the questions. All other items were based on the outcomes of the qualitative strand.

Section B had one question on 'port sustainability' with a total of 11 items. The items in this question included indicative elements such as in-house port planning capability (B1.2) and publication of annual environmental management performance reports (B1.8), and port governance related items such as public ownership of ports (B1.9) and enhanced private sector participation in ports (B1.10).

Section C had one question related to 'building collaborative advantages' for ARPs with a total of nine items. It included one indicator item about the number of collaborative activities of port (C1.6), and two port governance related items about the need for financial autonomy (C1.9) and policy support for collaborative activities (C1.5).

Section D had one question about ARPs' participation in the RIS. The question contained seven items with one indicator item about ports incentives and support to regional business incubation (D1.7), and a governance related item about ports' pro-activeness within regional networks (D1.1).

Section E had one question on ARPs' further strategic initiatives contributing to regional development with a total of 11 items. The items were selected mainly from relevant literatures to cover the depth and breadth of the subject.

Section F contained seven questions seeking the respondents' demographic information. The length, breadth, and depth of the ARPs' involvement in regional development were considered in designing this quantitative instrument.

6.7.2 Developing scales for items

The choice of scale depends on the research objectives, types of items, measurement requirements and themes of questions (Creswell 2012; Creswell & Plano Clark 2011). A 5 point Likert scale was used for the matrix questions. The scales attached to items in this questionnaire provided the opportunity to quantify the issues being measured (Leedy & Ormrod 2010) and to explore the trend of participants' responses about an issue (Salant & Dillman 1994). Table 6.6 illustrates the design of the questionnaire at a glance.

The 5-point Likert scale offers the following benefits for this questionnaire development:

1) It provides enough granularity for strategic management research (Dawes 2008) to fit the spread of opinions observed under major themes emerging from the telephone interviews.
2) It clearly reflects the level of agreement on the importance of certain constructs and dimensions (Teddlie & Tashakkori 2009) for ARPs' involvement in regional development.
3) It is suitable for exploring the extent of strategic importance of various issues around a unipolar scale, which is the research objective and measurement requirement of this study.

4) It provides optimal length of rating to maximise reliability and validity of the results (Dawes 2008).
5) It is convenient for generating manageable SPSS integrated data for statistical analysis (SurveyMonkey 2012).
6) It fits well with the web-based design.
7) It is appropriate for a group of items defining certain standardised functions and indicators (Cooper & Schindler 2011; Hardy & Bryman 2004) as it is framed for strategic initiatives for ARPs to be better involved in regional development.

Table 6.6: Item schedule in the questionnaire by type and scale

Questionnaire section (Subject)	Question type- Option/answer type (Total question number)	Number of items*	Scale type	% in terms of total number of items
Section A (General findings)	Matrix choice- Only one answer per row (4)	20	5- point Likert	30.8
Section B (ARPs sustainability)	Matrix choice- Only one answer per row (1)	11	5- point Likert	16.9
Section C (collaboration with other regional organisations)	Matrix choice- Only one answer per row (1)	9	5- point Likert	13.9
Section D (ARPs participation in regional innovation)	Matrix choice- Only one answer per row (1)	7	5- point Likert	10.8
Section E (Strategic initiatives)	Matrix choice- Only one answer per row (1)	11	5- point Likert	16.9
Section F (Demographic information)	Multiple choice- Only one answer (6)	6	-	9.2
	Open- Single text box (1)	1	-	1.5
Total	(15)	65	-	100.0

* Text boxes were also provided in each section for allowing additional information

6.7.3 Pre-testing of the instrument and ethics addendum

Pre-testing is an important step in fine-tuning any questionnaire (Sue & Ritter 2007). It is also an integral part of designing an effective online questionnaire. Pre-testing of the quantitative instrument is also a crucial for verifying some of the ethical issues; it helps in developing and testing the adequacy of the instrument and in assessing the workability and feasibility of the survey (Teddlie & Tashakkori 2009; Van Teijlingen & Hundley 2001).

A good questionnaire requires feedback from a variety of sources (Dillman 2000) and pre-testing provides opportunities to get this valuable feedback. The purposes of survey questionnaire pre-testing include ensuring the accuracy of the questionnaire, establishing the relevance of the questionnaire, estimating participants' probable satisfaction, and evaluating the overall effect of the questionnaire (Salant & Dillman 1994). As recommended by Salant and Dillman (1994), the pre-testing of this survey questionnaire was completed in three stages. As Cahoon (2004) identified the first two stages of pre-testing can be termed as 'developmental pre-testing' and 'polishing pre-testing'. The third pre-testing stage for this questionnaire can be termed 'web version pre-testing'.

In the first stage (developmental pretesting), 6 participants were asked to complete the questionnaire and to comment on its comprehensibility, relevance, and consistency (Salant & Dillman 1994). They were each given a paper version of the questionnaire with a three page 'participant information sheet' (see Appendix G). Most of the pre-test participants had an engineering background, with work experience in ports and/or shipping which was relevant to the port stakeholder population (Sue & Ritter 2007). The outcomes of this stage ensured the comprehensibility of the questions and exposed the shortcoming of other questions. It also suggested the time required to respond to the questionnaire.

In the second stage (polishing pre-testing), 14 participants who were typical of likely respondents took part in the pre-testing. These participants had an academic background and/or research experience in the field of maritime affairs (Salant & Dillman 1994). A revised paper version of the questionnaire was provided and the participants were asked to identify technical problems such as inconsistencies in wording, formatting, question ordering, navigational signage, information, item scaling and timing.

Following feedback on the second stage pre-testing, the questionnaire was fine-tuned and some items were discarded (Dillman, Smyth & Christian 2009). Other items were rephrased or reworded (Salant & Dillman 1994), placement of some items was shifted to avoid influence from neighbouring questions (Cooper & Schindler 2011) and the scale of some items was revised to ensure consistency (Dillman 2000). The pre-testing resulted substantial revision of the questionnaire to achieve face validity (Cahoon 2004) and internal reliability (Hardy & Bryman 2004) of the survey instrument.

With the completion of the second stage polishing pre-testing, the paper questionnaire and the ‘Participant information sheet’ were submitted to the ethics committee as ethics addendum for approval. Other relevant documents included an invitation letter and a revised information sheet to match the web-based survey. After receiving ethics approval for the questionnaire, the web-based questionnaire was prepared with SurveyMonkey.com. Later in the third stage, two participants participated in pre-testing on the web-based questionnaire. They were asked to comment on the comparability between the paper version and the web version, particularly in regard to colour consistency, sequence and appearance. The web version of the questionnaire was finalised after fine-tuning and consultation with the primary supervisor. The survey was then

conducted in the quantitative strand by utilising the web version of this instrument.

6.8 Summary

This chapter presented the analysis results of the semi-structured telephone interviews to answer the two research questions of the qualitative strand. The growth of a region and a port are complementary, which in turn accelerates regional development. The results revealed that ARPs can contribute to regional development through ensuring port sustainability, building collaborative advantages with other regional organisations and being active participants in the regional innovation system. The current issues of ARPs are numerous, and can be best addressed by fixing the fundamental building blocks of ARPs, such as ports' long term planning and sustainability issues. ARPs are economic strategists within various networks in their regions. It emerged that the position of ARPs as network leaders can be further developed to regional enablers by serving regional customers, communities and port stakeholders, and by ensuring efficient port performance. Within the socio-economic, geographic and environmental matrix, ARPs' collaboration with other regional organisations for mutual benefit and innovation are critical for regional development. The chapter proposed a conceptual model for ARPs involvement in regional development, and an instrument (questionnaire) was developed for further empirical examination. The next chapter will present the data analysis of the quantitative strand and finally integrate the literature review, qualitative and quantitative results.

CHAPTER 7: QUANTITATIVE RESULTS AND DISCUSSION

7.1 Introduction

Chapter 6 presented the results of telephone interview data analysis, which generated a conceptual model of ARPs' involvement in regional development. A web-based survey instrument (questionnaire) was developed to investigate the strategies that Australian regional ports could adopt for better involvement in regional development.

This chapter reports data analysis of the web-based survey in order to answer the two research questions (RQ 3 and RQ 4) of the quantitative strand stated in chapter 5:

> RQ 3: What are the factors pertinent to Australian regional ports' involvement in regional development?
>
> RQ 4: What strategic initiatives can be undertaken by Australian regional ports to be better involved in regional development?

The chapter begins with an examination of the demographic information for the 101 web-based survey respondents, and then presents descriptive statistics. The exploratory factor analysis (EFA) is performed for data analysis, followed by the confirmatory factor analysis (CFA). Finally, data from both strands is integrated to draw inference on ARPs' involvement in regional development, which answers the explicit mixed methods research question stated in chapter 5:

> Ex-MMQ: How can Australian regional ports effectively contribute to regional development?

7.2 Response rate

The questionnaire was distributed to Australian regional port stakeholders divided into three strata, including port officials (internal port stakeholders), port policy and planning contributors (external port stakeholders) and port users (external port stakeholders). Table 7.1 shows the response rates for the three strata of port stakeholders surveyed. The total of 219 stakeholders were selected for the survey, including 56 port officials, 74 port policy and planning contributors and 89 port users. From the port officials, 23 responses were received and a 41.1% response rate was achieved. A total of 34 responses were received from port policy and planning contributors and the response rate was 45.9%. A total of 44 responses were received from port users, representing a 49.4% response rate. In total, a 46.1% response rate was achieved (101 respondents) thus giving a reasonable credence to the web survey nature of this study (Kwak & Radler 2002; Sue & Ritter 2007).

Table 7.1: Response rates for the web-based survey

Stratum	Sample size	Response received (Percentage)	Response rate
Port officials	56	23 (22.8%)	41.1%
Port policy and planning contributors	74	34 (33.7%)	45.9%
Port users	89	44 (43.6%)	49.4%
Total	219	101 (100%)	46.1%

7.3 Demography of the survey respondents

The demographic information collected from the survey helped to understand the characteristics of respondents and to analyse any potential differences across port stakeholders. The demographic information included each respondent's position, experience, organisation, the state/territory where the organisation is located, major activities of the concerned regional port, name of the regional port in the concerned

region, and the extent of interaction of the respondent with the regional port. Table 7.2 presents a summary of survey respondents' position, year of experience and location.

Table 7.2: A summary of survey respondents' profile and characteristics

Stratum Classifications	Port officials stratum (% within stratum)	Port policy and planning contributors stratum (% within stratum)	Port users stratum (% within stratum)	Total (% of total response)
Position				
Chief Executive Officer / Division Head / Division Manager	12 (52.2%)	18 (52.9%)	11 (25%)	41 (40.6%)
General Manager /Senior Manager /Business Owner	8 (34.8%)	4 (11.8%)	21 (47.7%)	33 (32.7%)
Manager/Executive	3 (13%)	12 (35.3%)	12 (27.3%)	27 (26.7%)
Total	23 (100%)	34 (100%)	44 (100%)	101 (100%)
Year of experience				
> 10 years	15 (65.2%)	20 (58.8%)	24 (54.5%)	59 (58.4%)
6 – 10 years	5 (21.7%)	6 (17.6%)	11 (25%)	22 (21.8%)
<= 5 years	3 (13%)	8 (23.5%)	9 (20.5%)	20 (19.8%)
Total	23 (100%)	34 (100%)	44 (100%)	101 (100%)
State				
WA	5 (21.7%)	11 (32.4%)	8 (18.2%)	24 (23.8%)
SA	1 (4.3%)	5 (14.7%)	0 (-)	6 (5.9%)
VIC	7 (30.4%)	4 (11.8%)	2 (4.5%)	13 (12.9%)
NSW	1 (4.3%)	6 (17.6%)	14 (31.8%)	21 (20.8%)
QLD	5 (21.7%)	6 (17.6%)	4 (9.1%)	15 (14.9%)
NT	2 (8.7%)	0 (-)	0 (-)	2 (1.9%)
TAS	2 (8.7%)	2 (5.9%)	16 (36.4%)	20 (19.8%)
Total	23 (100%)	34 (100%)	44 (100%)	101 (100%)

7.3.1 Respondents' position and experience

The respondents of this survey were experienced port stakeholders in key management positions. 40.6% of the respondents were in the position of Chief Executive Officer (CEO) or equivalent, 32.7% were General Manager (GM) or equivalent and 26.7% were in Manager or Executive positions (Table 7.2).

Among the 23 port official respondents, more than half of the respondents (52.2%) held CEO or equivalent positions, while 34.8% and 13% of the respondents held GM or equivalent positions and Manager or Executive positions respectively. Of the 34 port policy and planning contributors, more than half (52.9%) of the respondents were in CEO or equivalent positions, 35.3% were in Manager or Executive positions, and the remainder (11.8%) were in GM or equivalent positions. 47.5% of the 44 port user respondents held GM or equivalent positions, while 25% and 27.3% of respondents held CEO or equivalent positions and Manager or Executive positions respectively.

Table 7.2 shows that more than half (58.4%) of the respondents had more than 10 years of work experience, while 21.8% had work experience of between 6 and 10 years and 19.8% had 5 years or less experience. In each stratum, the highest number of respondents had more than 10 years of work experience; in the port official stratum it was 65.2%, in the port policy and planning contributors stratum it was 58.8% and in the port user stratum it was 54.5%. This range of experience ensured practical and insightful data collection through the survey.

7.3.2 Respondents' organisations and nature of business

In terms of the nature of business and organisation, of the total 101 respondents, 23 (22.8%) were port internal stakeholders from port authorities/corporations and 89 (77.2%) were external port stakeholders consisting of port policy and planning contributors and port users.

Among the 34 respondents of port policy and planning contributors, 19 (55.9%) were from regional development agencies, 5 (14.7%) were from the Federal Government, 8 (23.5%) were from State Governments, and the remaining 2 (5.9%) were from local Government associations (Figure 7.1). The respondents working for the Federal Government indicated that they were located in other states such as New South Wales, Victoria and Queensland.

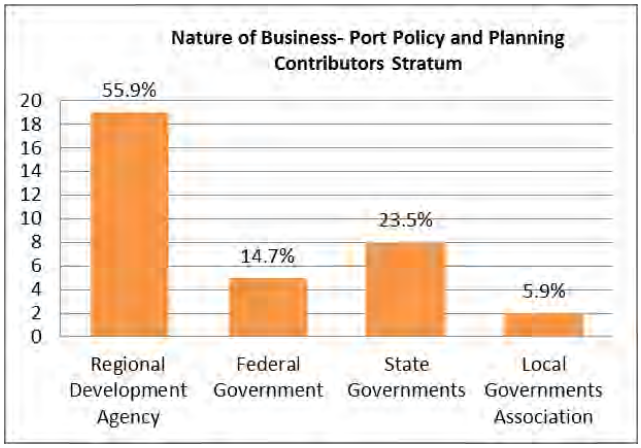


Figure 7.1: Business nature of 'Port Policy and Planning Contributors' stratum respondents

Among the 44 respondents of the port users stratum, 12 (27.3%) respondents were from exporters/importers, 11 (25%) were from shipping companies, 5 (11.4%) were representatives from Chambers of Commerce in various regions, 7 (15.9%) were from logistics companies, 5 (11.4%) were from freight forwarders, and 4 (9.1%) were from transport operators (see Figure 7.2).

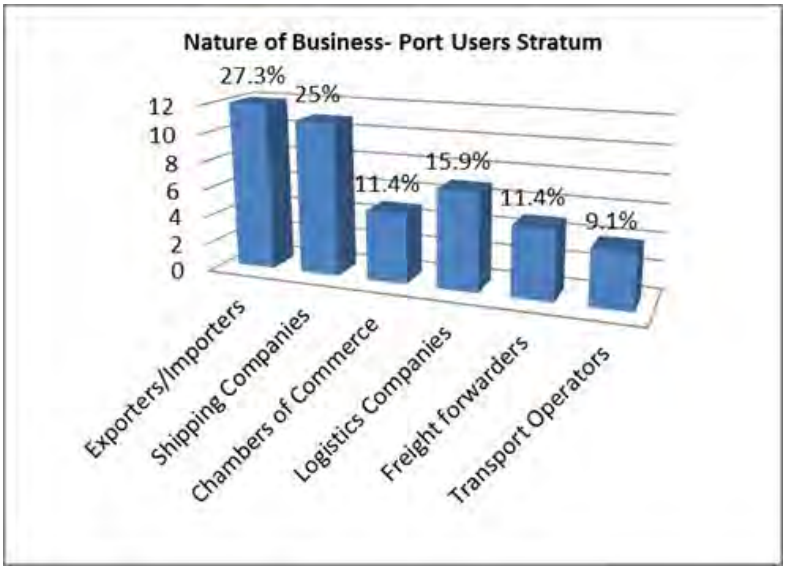


Figure 7.2: Business nature of 'Port users' stratum respondents

7.3.3 Respondents' location

Figure 7.3 shows the location of the respondents' organisations. A total of 24 (23.8%) respondents, the highest number, reported that their organisations were located in Western Australia (WA) which is the largest state in Australia with 20 functional ports and 4 proposed new ports.

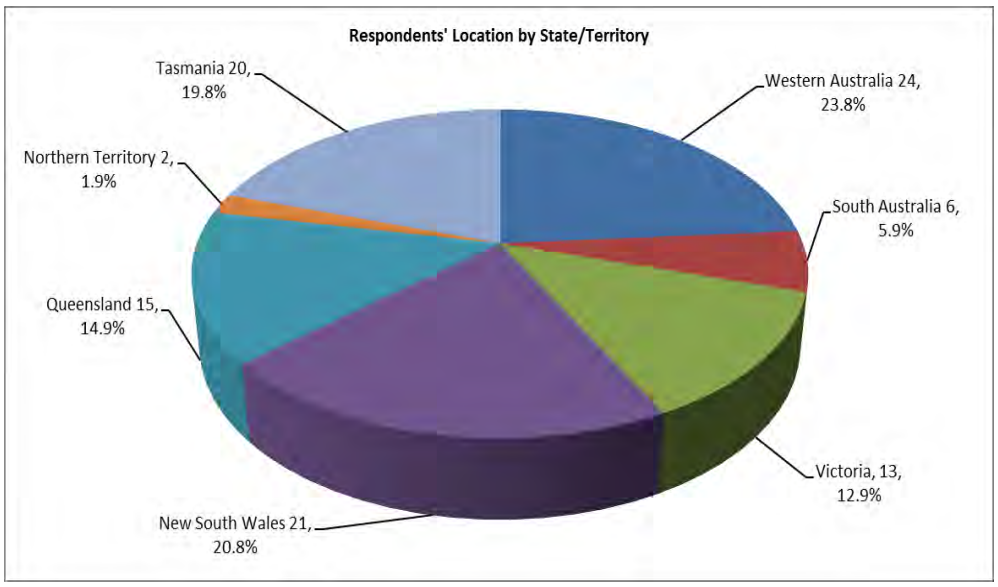


Figure 7.3: Respondents' location by State/Territory

Only 2 (1.9%) respondents' organisations were in the Northern Territory (NT), which has only 1 regional port and 3 single user privately operated small ports. 6 (5.9%) respondents reported that their organisations were located in South Australia, where the private port operator Flinders Ports operates the metropolitan city port, Adelaide port, and six other regional ports. Victoria, New South Wales, Queensland and Tasmania contributed 13 (12.9%), 21 (20.8%), 15 (14.9%) and 20 (19.8%) respondents respectively.

In the port official stratum, 7 responses were received from the state of Victoria, accounting for the highest number, with only one from each of the states South Australia and New South Wales (Table 7.2). In the port policy and planning contributor stratum, Western Australia contributed the highest number of responses (11) while Tasmania contributed the lowest (2). In the port users' stratum, Tasmania contributed the highest (16) and Victoria contributed the lowest (2) number of responses.

No response was received in the port policy and planning contributor stratum and port users stratum from the Northern Territory. No response was received in any stratum from the Australian Capital Territory (ACT) as it has no regional port.

7.3.4 Major activities of ARPs and respondents' interaction with ports

Table 7.3 presents ARPs' activities and respondents' interaction with ports. The leading activity of Australian regional ports is bulk cargo handling (58.5%), with container handling and general cargo handling activities contributing 22.8% and 16.8% respectively. 1.9% of the respondents specifically mentioned that their concerned regional ports are involved in serving cruise ships and fishing vessels, and roll-on roll-off trailer cargo related activities.

Table 7.3: ARPs activities and respondents interaction with ports

Activities/Interaction	Response %
Dominating regional port activities	
Bulk cargo handling	58.5
Container handling	22.8
General cargo handling	16.8
Others (service to cruise ships and fishing vessels, roll on- roll off cargo)	1.9
Respondent's interaction with regional ports	
Direct and/or frequent	52.5
Occasional	41.6
Never	5.9

Regarding interaction with regional ports, a total of 52.5% respondents expressed that they had direct and frequent affiliation with regional ports; they were either port employees or had regular interaction as port users or as Government or regional development agencies. 41.6% of the respondents stated that they had some occasional interaction with regional ports, which included respondents from the Chamber of Commerce, logistics companies, transport operators and industry associations. 5.9% of the respondents mentioned that they had no interaction with regional ports, which included respondents from remote regional development agencies, shipping companies, and exporters/ importers. These organisations are indirect beneficiaries of regional ports as their clients are heavily dependent on regional ports.

7.4 Descriptive statistics

This section presents descriptive statistics of the responses to questions in Sections A to E of the questionnaire, where a 5-point Likert scale was used for measuring 5 constructs. The constructs were port-region relationship, port sustainability, building collaborative advantages, active participation of port in the RIS and ARPs strategic initiatives for regional development. The first construct was aimed at capturing the extent and breadth of existing relationships between Australian regional ports (ARPs) and their host regions, while the other four constructs were empirically

tested as latent variables for the dependent variable ‘ports contribution to regional development’. The items for each latent variable were regarded as the independent variables (Carifio & Perla 2007; Pallant 2011). The Likert scale items (Likert scale response format) produced interval data at scale level (Carifio & Perla 2007). This ensured the parametric nature of the data and allowed the use of parametric statistical tools to analyse data (Carifio & Perla 2007, 2008).

Descriptive statistics were computed for each item to operationalise the constructs/scales (analysed later in this section). The evaluated descriptive statistics of each item included frequency (no. of responses), mean, 5% trimmed mean, median, standard deviation (SD), skewness and kurtosis (see Table H-1 in Appendix H for detail descriptive statistics). As the responses were on a 5-point Likert scale, the median showed the trend of responses for each item. The mean and 5% trimmed mean of responses for each item were found to be very similar, which illustrated no influence or presence of extreme scores (Rovai, Baker & Ponton 2013). The standard deviations of items were within a range between 0.50 and 1.41. The skewness and kurtosis in most cases were within the optimal range of +/- 1.00 which also illustrated the parametric nature of the data (Pallant 2011; Rovai, Baker & Ponton 2013).

Table 7.4 also shows the construct-wise summary statistics of the responses across three strata of port stakeholders. The mean of item means across responses of three strata ranges between 3 and 4, while the mean of item variances across responses of three strata are low. These low mean of item variances indicate high homogeneity of data across each construct. The mean of inter-item correlations was also reported across each stratum. All values were found to be positive and around the optimal range of 0.2 to 0.4, indicating that the items were measuring the same underlying characteristics through each construct (Pallant 2011).

Table 7.4: Construct-wise summary statistics across responses of port stakeholders

Section/Construct	No. of Items	Summary statistics								
		Port officials			Port planning and policy Contributors			Port users		
		Mean			Mean			Mean		
		Item Means	Item Variances	Inter-Item Correlations	Item Means	Item Variances	Inter-Item Correlations	Item Means	Item Variances	Inter-Item Correlations
A. Port-region relationship	19	3.75	0.98	0.25	3.62	0.98	0.26	3.54	1.09	0.32
B. Port sustainability	11	3.74	0.87	0.29	3.94	0.68	0.25	3.84	0.94	0.30
C. Building collaborative advantages	9	3.73	0.68	0.30	4.08	0.79	0.41	4.02	0.78	0.51
D. Active participation of port in RIS	7	3.27	0.98	0.39	3.47	1.32	0.48	3.63	1.16	0.66
E. Port strategy to RD	11	3.12	0.97	0.29	3.60	089	0.28	3.36	1.23	0.54

In the following sections reliability of the constructs, missing data analysis, and descriptive statistics of survey items of each construct are discussed.

7.4.1 Reliability of the Constructs / Scales: Cronbach's Alpha

Cronbach's Alpha (α) reliability analysis was conducted to assess the internal consistency of each of the five constructs/scales (see Table 7.5). Internal reliability was considered acceptable to good for each of the constructs/scales, at .7 or above (Field 2009; Pallant 2011).

The Cronbach's Alpha values for the five constructs/scales of this study were found to be well above 0.7, which ensured the scale's internal consistency. The differences between 'Cronbach's Alpha values' and 'Cronbach's Alpha values based on standardised items' for each scale/construct were very small, indicating roughly similar item means and standard deviations for each item in the scales (Rovai, Baker & Ponton 2013).

Table 7.5: The Cronbach's Alpha tests of the 5 Constructs/Scales

Scale/Construct	Questionnaire section	No. of items	Cronbach's Alpha	Cronbach's Alpha based on standardised items
Port-region relationship	A	19	0.77	0.79
Port sustainability	B	11	0.79	0.81
Building collaborative advantages	C	9	0.87	0.87
Active participation of port in RIS	D	7	0.89	0.89
Port's strategic initiatives to RD	E	11	0.88	0.89

7.4.2 Missing data analysis

The missing data for each item was minimal (less than 5%). Table 7.6 shows a total scenario of the missing data analysis. This relatively

insubstantial missing data should not affect the study results (Rovai, Baker & Ponton 2013). However, in general the 'Exclude cases pairwise' option of SPSS has been used because of its relevance to any specific analysis and in order to reduce the effect of missing data (Pallant 2011).

The 'Exclude cases pairwise' option allowed exclusion of a case (respondent) for specific analysis if there was missing data in an item. Other necessary information on different items from the same respondent remained intact for further new analysis. The SPSS also exclude the 'don't know' responses from any statistical analysis, which were scaled as '0' in the questionnaire.

7.4.3 Relationship between ARPs and their host regions

Four questions relating to the relationship between Australian regional ports and their host regions were presented to the respondents, including descriptions of ARPs, quality of transport links of the regional port and its region, the port's role in its region and the fundamental elements of ARPs' involvement in the region. Table 7.7 shows the descriptive statistics of 'port-region relationship' construct.

7.4.3.1 Descriptions of ARPs

Question A1 asked respondents about their description of an Australian regional port (APR). Item A1.3 (An Australian regional port is a port that assists regional primary producers, importers, exporters and/or serves the mining sector for its smooth operation) had the highest mean (4.15) followed by item A1.1 (An Australian regional port is a port outside metropolitan cities serving regional businesses) of 4.0, whereas item

Table 7.6: Missing data analysis at a glance

Section (Construct/Scale)	Missing data*								
Section A (Port-region relationship)	Item no.	**A1.3**	**A1.4**	**A2.3**	**A2.4**	**A2.5**	**A4.1**	**A4.2**	**A4.3**	**A4.4**
	No. of missing data	4	1	1	1	2	1	1	1	2
	% of the total response	3.96%	0.99%	0.99%	0.99%	1.98%	0.99%	0.99%	0.99%	1.98%
Section B (Port sustainability)	Item no.	**B1.5**			**B1.7**			**B1.11**		
	No. of missing data	2			1			1		
	% of the total response	1.98%			0.99%			0.99%		
Section C (Building collaborative advantages)	Item no.	**C1.9**								
	No. of missing data	1								
	% of the total response	0.99%								
Section D (Active participation of port in RIS)	Item no.	**D1.3**					**D1.6**			
	No. of missing data	1					1			
	% of the total response	0.99%					0.99%			
Section E (ARPs strategic initiatives)	Item no.	**E1.9**			**E1.10**			**E1.11**		
	No. of missing data	1			1			2		
	% of the total response	0.99%			0.99%			1.98%		

* Missing data includes the ‘don’t know’ option in the questionnaire and no response was found in the ‘don’t know’ option

Table 7.7: ARPs relationships with their host regions

Question/Item	Mean	SD
Question A1: To what extent do you agree or disagree with the following descriptions of an Australian regional port?		
A1.1 An Australian regional port is a port outside metropolitan cities serving regional businesses	4.0	1.13
A1.2 An Australian regional port is a non-capital city port to help regional businesses	3.86	1.27
A1.3 An Australian regional port is a port that assists regional primary producers, importers, exporters and/or serves mining sector for their smooth operation	4.15	0.78
A1.4 A uniform definition of an Australian regional port is not essential as each port has a different geographical setting	3.84	0.96
Question A2: Please indicate the 'quality of links' of the regional port in your region with the following?		
A2.1 Road network	3.55	0.91
A2.2 Rail network	2.55	1.19
A2.3 Coastal shipping	3.10	1.18
A2.4 International shipping	3.11	1.41
A2.5 Air transport access	2.73	1.24
Question A3: To what extent do you agree or disagree with the following statements about the regional port in your region?		
A3.1 A facilitator of trade and transport	4.08	0.89
A3.2 An economic strategist as it participates in regional economic policy and planning initiatives in the region	3.51	1.04
A3.3 A gateway in a system consisting of supply chains, logistics, trade, and transport networks	4.11	0.75
A3.4 An objective stakeholder as it has an interest in overall efficiency of supply chains rather than only on the parts of supply chains that exist in port premises	3.51	1.04
A3.5 A hub for regional economy for its pivotal position for cargo movements and related activities	4.07	0.85
A3.6 A community manager by coordinating regional stakeholders to achieve collective targets	3.21	1.00
Question A4: How important are the following to the regional port in your region?		
A4.1 The port pursues commercial objectives that have positive impact on regional development	4.17	0.90
A4.2 The port engages in business opportunities for the region	4.02	0.95
A4.3 The port requires more autonomy for better involvement in regional development	3.30	1.24
A4.4 The port delivers specialised skills enhancing competence of the region and in turn improves the standard of living	3.39	1.21

A1.4 (A uniform definition of an Australian regional port is not essential as each port has a different geographical setting) had the lowest mean (3.84).

It has been shown in the literature review and through telephone interview outcomes that an ARP is not seen simply as a non-capital city port, but is situated in regional Australia outside metropolitan cities [Perth (Fremantle port), Sydney, Melbourne, Adelaide and Brisbane]. Therefore, the description that an Australian regional port is a port outside metropolitan cities serving regional businesses (item A1.1) supports this notion. Additional comments on the description of ARPs were also received from some respondents shown as follows:

- A regional port is a potential forward logistics base for Defence
- Regional based ports are of state and national significance as they serve more than regional clients - they add to the collective effort for export
- Regional port can support major centres as alternative due to congestion in major ports as long as road/rail infrastructure is effective
- A regional port should be a facilitator of trade - this should be their prime role
- The proximity of a regional port to the city is important

Among these comments ‘a potential forward logistics base for defence’, ‘a regional port can support major centres as an alternative due to congestion in major ports’ and ‘a regional port should be a facilitator of trade’ are quite significant for Australia as it is an island nation. Considering these responses, an Australian regional port can be best described as a port outside metropolitan cities which facilitates regional trade, serves regional producers, businesses and the mining sector, provides a defence logistics base, and contributes to congestion reduction for metropolitan ports.

7.4.3.2 Quality of links with transport networks

Question A2 was devoted to investigating the quality of ARPs' links with other transport networks. The results showed that the quality of links with road networks, coastal shipping and international shipping was above the average of 3, which were 3.55, 3.11 and 3.10 respectively (see Table 7.7). On the other hand, respondents expressed that the quality of links between ARPs and rail and air transport network was poor, with a mean of 2.55 and 2.73 respectively. No item had a mean over 4, implying that the overall quality of linkages of ARPs with the transport networks needs to be improved.

A further examination of the data in Table 7.8 indicated that 62% of the respondents believed that road connectivity to their regional ports were either good or excellent. As far rural Australia is concerned, the quality of road links with regional ports is still a factor for development as 7% of the ports have poor to very poor road links. About 41% of the respondents disclosed that regional ports in their region had very poor or poor rail links, indicating a missing or degraded link between regional ports and rail networks.

Table 7.8: Response on quality of links between regional ports and other transport networks

Item	Road network	Rail network	Coastal shipping	International shipping	Air transport access
Excellent	8%	2.02%	9%	12%	5.05%
Good	54%	22.22%	32%	40%	22.22%
Average	30%	33.33%	32%	19%	37.37%
Poor	6%	20.20%	17%	9%	16.16%
Very poor	1%	21.21%	7%	16%	14.14%

About 41% of the respondents indicated that they had good to excellent coastal shipping links, whereas the share of coastal shipping as freight transportation mode was decreasing (BITRE 2013). About 25% of the

respondents stated that their regional ports had poor to very poor international shipping links and 30% of the respondents indicated that their regional ports' connectivity to air transport was poor to very poor. Overall, the responses about the quality of links between regional ports and other transport networks indicated that intermodal linkages and facilities connecting regional ports need to be improved in order to accommodate Australia's rapidly growing freight requirements (Infrastructure Partnerships Australia 2009a). Determining and working on the missing links and phasing out or upgrading the existing links is important for ARPs. This will enhance regional ports' relationships with their host regions.

7.4.3.3 Roles of Australian regional ports in regions

Respondents expressed agreement on the role that their regional ports currently play. The roles of Australian regional ports (ARPs) in their host regions included facilitator for trade and transport, economic strategist, gateway in a network system, objective stakeholder and hub for regional economy (regional enabler). Table 7.7 (Question A3) shows the results of the top 3 roles that ARPs play, with a mean over 4, are a gateway in a network system (4.11), trade and transport facilitator (4.08) and hub for regional economy (regional enabler) (4.07). It is interesting to note that ARPs were not seen to be active community managers, with this response having the lowest mean of 3.21.

The finding revealed that apart from the traditional role as a trade facilitator, ARPs play the roles of gateway and regional enabler significantly at present. In fact, each ARP has its own geographical setting which may influence its role in the host region. A port's willingness and proactiveness also determine the extent of its involvement in the region. Depending on the demand, a regional port may play several roles in its region.

7.4.3.4 The fundamental elements of ARPs for involvement in the region

The fundamental elements of ARPs' involvement in regional development were investigated in question A4. Table 7.7 revealed that the means of items A4.1 (pursuance of commercial objectives) and A4.2 (engagement in business opportunities in region) were above 4 (very important), which were 4.17 and 4.02 respectively. However, item A4.3 (requirement of more autonomy for involvement in regional development) and item A4.4 (delivering specialised skills to enhance regional competence and to improve standard of living) had means of 3.30 and 3.39 respectively.

The result indicates that pursuance of commercial objectives, engagement in regional business opportunities and delivering specialised skills and enhancing competence of the region for improving the standard of living have significant importance and are essential for ports' involvement in the region. However, the requirement for more autonomy to be better involved in regional development, despite important, is not considered an essential element for ARPs.

7.4.4 Port sustainability

Respondents were asked to indicate the importance of 11 items related to port sustainability from a strategic management perspective. Table 7.9 shows the descriptive statistics for 'port sustainability' construct. Four of the 11 items such as long term plan (B1.1), port's financial viability (B1.3), access to funding for port development (B1.7) and innovation in port sector (B1.11) had means above 4 (very important), revealing that they are significant for port sustainability from strategic standpoint. On the other hand, public ownership of ports (B1.9) had the lowest mean of 2.81, indicating that respondents did not consider the public ownership of ports important to port sustainability, but that enhancing private sector participation (B1.10, mean 3.63) in ports was more important to port sustainability.

Table 7.9: Australian regional ports sustainability issues

Question/Item	Mean	SD
Question B1: How important are the following to your regional port's sustainability?		
B1.1 A long term plan	4.69	0.50
B1.2 In-house planning capability	3.95	0.90
B1.3 Port's financial viability	4.45	0.69
B1.4 Nurturing environment	3.48	1.07
B1.5 Enhancement of social networks with regional stakeholders	3.53	0.92
B1.6 Strengthening the relationships with cities and towns	3.82	0.84
B1.7 Access to funding for port development	4.30	0.82
B1.8 Publishing annual environmental report indicating trends in port's environmental management performance	3.47	0.82
B1.9 Public ownership of the port	2.81	1.40
B1.10 Allowing increased private sector participation in ports	3.63	1.09
B1.11 Innovation in the port sector activities	4.25	0.74

In-house planning capability (B1.2, mean 3.95) and strengthening the relationship with cities and towns (B1.6, mean 3.82) each had a mean close to 4. This revealed that ARPs should improve their in-house planning capability and relationships with cities and towns for better involvement in regional development. Other items, such as enhancement of social networks with regional stakeholders (B1.5, mean 3.53), nurturing environment (B1.4, mean 3.48) and reporting environmental management performance (B1.8, mean 3.47) also had moderate importance for port sustainability.

7.4.5 Building collaborative advantages for ARPs

Nine items were included for the construct on 'building collaborative advantages' in question C1. Table 7.10 shows the descriptive statistics of the construct. Five of the 9 items had means above 4, implying that the respondents viewed collaboration as a very important strategy for ARPs to adopt. The item C1.2 (joint efforts of ports for supply chain efficiency) had the highest mean of 4.25 and item C1.7 (ports involvement in non-core or non-maritime businesses) had the lowest mean of 3.62.

Table 7.10: ARPs in building collaborative advantages

Question/Item	Mean	SD
Question C1: How important are the following to your regional port to build collaboration?		
C1.1 Exchanging information as a pivotal point in supply chain networks	4.15	0.67
C1.2 Making joint efforts with supply chain actors to increase supply chain efficiency	4.25	0.74
C1.3 Developing a flexible structural, functional and planning environment consistent to regional demands	4.22	0.72
C1.4 Sharing port resources for collaboration with regional organisations	3.93	0.91
C1.5 Having policy support to be involved in collaborative activities with regional organisations	4.01	0.84
C1.6 Making continuous efforts to increase the number of collaborative activities with regional organisations	3.87	0.92
C1.7 Making interaction with different sector organisations including non-core or non-maritime businesses	3.62	1.04
C1.8 Coordinating port-centric logistics networks	4.07	0.91
C1.9 Having more financial autonomy to port management to join in collaborative regional projects	3.66	1.09

Relatively greater standard deviations were found for items C1.7 (interaction with different sector organisations including non-core or non-maritime businesses) and C1.9 (more financial autonomy for ports to join in collaborative regional projects). Overall, the descriptive statistics indicated that all items are very important for building collaborative advantages for ARPs. However, the responses were more diverse on ports' interaction with non-core or non-maritime businesses and on more financial autonomy for ports to join in collaborative regional projects.

7.4.6 Participation of ARPs in the Regional Innovation System (RIS)

Through question D1 respondents were asked to indicate the importance of seven items on ARPs' participation in the RIS. Table 7.11 shows the descriptive statistics of the items. Of the 7 items, only item D1.1 (Being proactive within the regional networks to exploit the business potential of the region) had a mean over 4 (4.12). However, item D1.2 (Demonstrating entrepreneurship for regional innovation to enhance regional competitive advantage) had a mean very close to 4 (that is, 3.95), which signifies the importance of entrepreneurship and innovation for ports.

Table 7.11: ARPs' active participation in the RIS

Question/Item	Mean	SD
Question D1: How important are the following to your regional port to participate in regional innovation?		
D1.1 Being proactive within the regional networks to exploit the business potential of the region	4.12	0.85
D1.2 Demonstrating entrepreneurship for regional innovation to enhance regional competitive advantage	3.95	0.91
D1.3 Having risk sharing approach in business engagement with other regional organisations	3.54	0.94
D1.4 Participating in regional resource utilisation planning activity and its implementation process	3.68	1.07
D1.5 Opening port as a knowledge centre for interactive learning for regional organisations	2.88	1.30
D1.6 Making efforts for capacity enhancement of other regional organisations	3.15	1.18
D1.7 Providing incentives and support to regional businesses in their early stage	3.11	1.26

Item D1.5 (Opening port as a knowledge centre for interactive learning for regional organisations) had the lowest mean (2.88) with highest standard deviation (1.30), revealing that the respondents were uncertain about opening ports as knowledge centres for interactive learning. Though this notion is not new in a European context (Allaert 2006) it might have been the first time that some of the survey respondents had considered it. However, some telephone interview participants (TIP02, TIP08 and TIP13) supported the concept in an Australian context. This contributed to forming a code (C18: Knowledge hub for regional economy) in the thematic analysis. Entrepreneurship and innovation (Item D1.2, mean 3.95) were viewed as significantly important, and the concept of 'knowledge and interactive learning' obviously has great potential. However, the strategy to implement the notion of item D1.5 was not clear to the respondents.

7.4.7 ARPs' strategic initiatives

Respondents were asked to indicate the importance of eleven strategic initiatives for ARPs' involvement in regional development. Table 7.12 shows the descriptive statistics of the items. Item E1.10 (Include regional strategic planning bodies and stakeholders in port's strategic planning

process) had the highest mean of 3.88, followed by E1.5 (Communicate effectively with the wider public, community and customers) with a mean of 3.80, E1.7 (Identify a mix of operational and strategic indicators for measuring port's contribution to regional development) with a mean of 3.74 and E1.11 (Manage port's own energy consumption nature for improving energy efficiency) with a mean of 3.47.

Table 7.12: Strategic initiatives for ARPs' involvement in Regional Development

Question/Item	Mean	SD
Question E1: How important are the following for your regional port's involvement in regional development?		
E1.1 Enhance corporate social responsibility	3.34	0.89
E1.2 Make the port relevant to various interest groups	3.26	1.04
E1.3 Participate beyond sponsorship in developing social infrastructure such as a community clinic, schools, housing, and regional access facilities	2.67	1.18
E1.4 Establish a regional buy policy for promoting regional procurement base	2.85	1.17
E1.5 Communicate effectively with the wider public, community and customers	3.80	1.00
E1.6 Improve the environmental standards beyond those required under legislation	3.41	1.06
E1.7 Identify a mix of operational and strategic indicators for measuring port's contribution to regional development	3.74	0.98
E1.8 Develop a database with stakeholders for research and information sharing	3.28	1.08
E1.9 Participate in region-centric visionary projects in close cooperation with regional organisations	3.44	1.22
E1.10 Include regional strategic planning bodies and stakeholders in port's strategic planning process	3.88	0.92
E1.11 Manage port's own energy consumption nature for improving energy efficiency	3.47	1.00

Two items with the lowest means were E1.3 (Participate beyond sponsorship in developing social infrastructure such as a community clinic, schools, housing, and regional access facilities) (mean 2.67) and E1.4 (Establish a regional buy policy for promoting regional procurement base) (mean 2.85). This indicates that developing social infrastructure might be difficult for ARPs, where the underlying cause could be a port's poor financial performance. ARPs would not be able to fully implement a

regional buy policy as some of the goods and services that ports require may not be available in regional Australia.

7.5 Exploratory factor analysis of ARPs contribution to regional development

Exploratory factor analysis (EFA) provides an opportunity to explore factor structure for a set of observed variables without imposing a predefined structure on the outcome (Suhr 2006). Therefore EFA has been used to evaluate the conceptual model framed in chapter 6. The EFA was based on the items of questions B1, C1, D1 and E1 in order to achieve a better factor structure (that is, clear pattern matrix).

7.5.1 Suitability of data

The suitability of the data is an important consideration before conducting factor analysis (Pallant 2011). Various suggestions have been made regarding this:

1) Opinions differ on the adequate sample size for factor analysis. Williams, Brown and Onsman (2010) provide a summary compiling various authors which suggests 100 or greater samples (Hair et al. 1998), 200 as fair (Comrey & Lee 1992), at least 300 (Tabachnick & Fidell 2007), 500 as very good and 1000+ as excellent (Comrey & Lee 1992). Pallant (2011) suggests a sample size of 150 is good, but less than that may require many variables. Some authors suggest a variety of choices for 'sample to variable (item) ratios' instead of sample size, which range from 3:1 to 20:1 (MacCallum et al 1999 in Williams, Brown & Onsman 2010).
2) Based on empirical results, Hogarty et al. (2005) noted that there is no minimum level of sample size or sample to variable ratio required to obtain a good factor recovery. For quality factor solution sample size has less influence when high communalities exist.

3) The data should be parametric in nature (Pallant 2011). Meeting assumption of normality as factor analysis can be ensured by the skew of each item having a value between + /- 1.00 (Minckler 2011).
4) Costello (2005) argues that uniformly high communalities without cross loadings indicate strong data for factor analysis.
5) Strength of correlations among items (variables) is also important for suitability of data for factor analysis (Tabachnick & Fidell 2007). A correlation coefficient of minimum +/- 0.3 is required, +/- 0.4 is important and +/- 0.5 is practically significant (Williams, Brown & Onsman 2010).
6) The Bartlett's Test of Sphericity should be significant at $p<0.05$ which would indicate sufficient correlations among variables to support a rational basis for factor analysis (Minckler 2011; Pallant 2011).
7) The Kaiser-Mayer-Olkin (KMO) index, a measure of sampling adequacy, should have a value of at least 0.60 in a range of 0 - 1, which ensures suitability of data for proper extraction of factors (Rovai, Baker & Ponton 2013).

The assumptions of measures for the suitability of data of this study are addressed along with the description of the results of EFA in section 7.5.6.

7.5.2 Factor extraction method

The main objective of factor extraction is to provide a simple solution with few variables explaining the maximum variance of the original data (Pallant 2011). Among numerous methods of factor extraction the most common methods are: principal component analysis (PCA), principal axis factoring (PAF), maximum likelihood, image factoring, alpha factoring, unweighted least squares and generalised least squares. It is important that the researcher employs a factor extraction method which provides a clear factor structure (Pallant 2011; Rovai, Baker & Ponton 2013).

Principal component analysis (PCA) has been adopted for this study as it provides a clear factor structure. It is commonly used for EFA because of its exploratory approach to fix number of factors for a satisfactory solution (Williams, Brown & Onsman 2010). PCA is a default method for numerous statistical software and there is no significant difference between PCA and PAF when variables have high reliability (Thompson & Daniel 1996), as is the case for this study where the data collection instrument was developed on the basis of telephone interview outcomes and through an extensive literature review.

7.5.3 Criteria for factor extraction

The reduction of a large number of items into an adequate number of factors is the ultimate aim of factor extraction (Pallant 2011). Many criteria are available to fix the total number of factors (Williams, Brown & Onsman 2010) such as:

- Kaiser's criteria (eigenvalue > 1),
- Scree plot (number of factors above the point of break), and
- Parallel analysis (factors are accepted when actual eigenvalues exceed random order eigenvalues).

It is desirable to use several criteria to determine the total number of factors, as this increases the acceptability level and provides a cross checking mechanism to reach a firm decision (Rovai, Baker & Ponton 2013). In this analysis, all abovementioned criteria have been checked to fix the appropriate number for total factors. The objective was to reach a solution which would retain most of the conceptual sense explaining more than 60% of the cumulative variance (Hair et al. 1998; Williams, Brown & Onsman 2010).

7.5.4 Selection of rotational method

A rotation helps to produce a comprehensible solution by maximising high item loadings and minimising low item loadings (Williams, Brown & Onsman 2010). Orthogonal and Oblique are two common rotation techniques which offer various methods to choose from (Field 2009). The most common is Orthogonal varimax rotation, which produces a solution with uncorrelated factor structure. Oblique rotation produces correlated factor structure where Promax is the faster alternative (Rovai, Baker & Ponton 2013). In this study, Oblique Promax rotation technique has been applied, as it is inclusive of Orthogonal rotation and capable of providing preferable and comprehensible solution for this analysis where correlated factor structure may exists (Rovai, Baker & Ponton 2013; Tabachnick & Fidell 2007; Williams, Brown & Onsman 2010).

7.5.5 Interpretation and labelling

Interpretation is a critical part of EFA which is simultaneously a subjective, theoretical, and inductive procedure to provide meaningful latent factors. The main objective of labelling is to operationalise the factors which should reflect the theoretical and conceptual intent (Tabachnick & Fidell 2007; Williams, Brown & Onsman 2010). In this study, a confirmatory factor analysis (CFA) has also been performed on the outcomes of EFA to achieve a model fit for a measurement model. Because of this, the labelling of latent factors has not been done after EFA, rather it has been performed after CFA. However, the retained items of EFA have been included in the discussion for mixing results and inference drawing purposes.

7.5.6 Results of EFA

As a Likert scale response format was used for data collection, the data met the assumptions of normality (discussed in section 7.4) (Carifio & Perla 2007, 2008). All items in questions B1 to E1 were subjected to the

EFA (extraction method principal components analysis (PCA) with Promax Oblique rotation) using SPSS version 21.

7.5.6.1 Initial unrotated results

In the initial run of the programme, the suitability of the data was assessed prior to performing further factor analysis. The correlation coefficients among items/variables at a moderate level (+/- .3) were checked. The majority of the item pairs met this assumption. The data was strong enough for factor analysis as it produced moderate to high extraction scores (from .4 to .8 or greater) for communalities (Table H-2, Appendix-H). The Kaiser-Meyer-Olkin index was 0.84, well above the recommended value (.60) which supported sampling adequacy. The Bartlett's Test of Sphericity was statistically significant (at p<.000), which meant that the items (variables) were correlated enough for a reasonable factor analysis (Table 7.13).

Table 7.13: KMO and Bartlett's Test (Initial run)

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.840
Bartlett's Test of Sphericity	Approx. Chi-Square	2310.474
	df	703
	Sig.	.000

To determine the number of factors to be extracted, the initial run revealed a presence of eight factors with eigenvalues exceeding 1 (Kaiser's criteria), explaining 35.89%, 6.58%, 5.86%, 5.34%, 3.64%, 3.54%, 3.33% and 3.07% of the variance respectively. The total cumulative variance explained by eight factors was 67.23% (Table 7.14). It is obvious that application of Kaiser's criteria generated too many factors. A closer look at the initial screeplot (Figure 7.4:) revealed a clear point of break (elbow) at the 5th component (factor), suggesting a 4-factor solution (Comrey & Lee 1992; Pallant 2011).

Table 7.14:Total Variance Explained (initial unrotated PCA extraction)

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	13.637	35.887	35.887	13.637	35.887	35.887	8.351
2	2.498	6.575	42.461	2.498	6.575	42.461	9.314
3	2.228	5.862	48.323	2.228	5.862	48.323	5.337
4	2.031	5.344	53.667	2.031	5.344	53.667	6.882
5	1.381	3.635	57.301	1.381	3.635	57.301	6.414
6	1.343	3.535	60.836	1.343	3.535	60.836	6.677
7	1.265	3.328	64.165	1.265	3.328	64.165	5.368
8	1.165	3.065	67.229	1.165	3.065	67.229	3.922
9	.992	2.610	69.839				
10	.891	2.345	72.184				
.....	.....	.....	....				

A parallel analysis using a MonteCarlo test was performed (Table 7.15). This supported a 4-factor solution because the eigenvalues of only 4-components/factors exceeded the corresponding criterion values for a randomly generated data matrix of the same size. Therefore, the decision to retain 4 factors or components was fed back into the SPSS as an extraction request to generate a 4-factor solution.

To have a clear 4-factor solution during the final investigation of this EFA, the following guidelines were followed in order to exclude or include items from a factor, and to retain factors:

- Items with moderate to high communalities (.4 to .8 or greater) were retained (Costello 2005)
- Items with loading > .5 were retained (Costello 2005; Gaskin 2013b; Tabachnick & Fidell 2007)
- Cross loaded items having a difference between two loadings >.2 were eliminated (Gaskin 2013b)

- Factors with three or more items having strong loading .5 or more were retained (Pallant 2011; Williams, Brown & Onsman 2010)

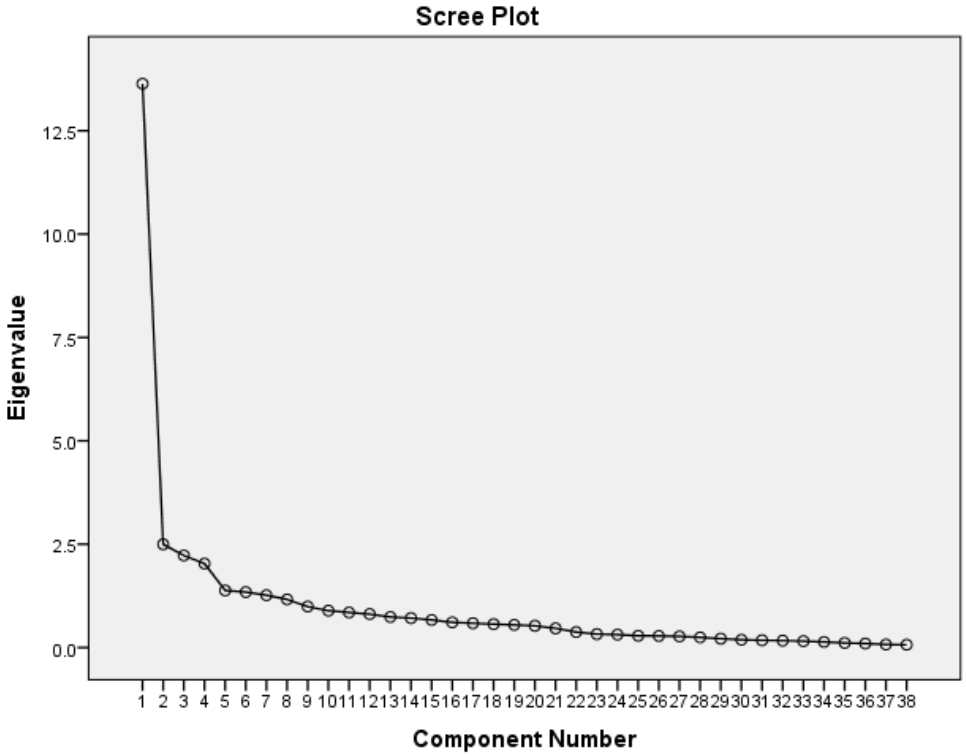


Figure 7.4: Initial screeplot of the exploratory factor analysis

Table 7.15: Comparison of eigenvalues from PCA extraction and criterion values from parallel analysis

Component number	Actual eigenvalue from initial run	Criterion value from parallel analysis*	Decision
1	13.637	2.4161	Accept
2	2.498	2.2311	Accept
3	2.228	2.0762	Accept
4	2.031	1.9543	Accept
5	1.381	1.8505	Reject
6	1.343	1.7585	Reject
7	1.265	1.6688	Reject
8	1.165	1.5884	Reject

* MonteCarlo PCA for Parallel Analysis (09/2013, 13:53:06) →Number of variables: 38, Number of subjects: 101, Number of replications: 100

Table 7.16 presents the unrotated loading of the items (component matrix) for eight factors in the initial run. This illustrates the scenario before executing a 4-factor solution with a PCA extraction and Promax (Oblique) rotation.

7.5.6.2 The results of a 4-factor pattern matrix in EFA

Table H-3 (Appendix H) presents a scenario for the 4-factor (final) unrotated component matrix after PCA extraction. Promax rotation is then applied to produce a 4-factor solution in SPSS. A simple factor structure is obtained later performing on it in accordance with the above mentioned guidelines. Table 7.17 shows the final output of the total variance explained. Four factors explained 63% of the cumulative variance. The first factor accounts for 37.6%, the second factor contributes 9.3%, the third factor adds 8.6%, and the fourth factor contributes 7.2% to the cumulative variance. Table 7.18 presents the final Pattern Matrix and Structure Matrix with corresponding loadings and communalities.

In EFA, the final pattern matrix at the rotated 4-factor solution illustrates the simple structure with each item loading substantially on only one of the four factors, in other words having no cross-loading. The four factors contain 22 items in total with factor loading .5 or above. The factors of this pattern matrix are not specifically characterised during the EFA because a CFA is conducted further to refine the pattern matrix where the final outcomes are labelled.

Table 7.16: Initial unrotated component matrix (Extraction method, PCA)

	Component							
	1	2	3	4	5	6	7	8
D1.2	.717	-.056	.316	.101	.161	-.107	-.075	-.377
E1.9	.712	-.098	.019	.047	.137	.294	.318	-.117
D1.6	.709	-.321	.132	.142	-.337	-.002	-.114	-.078
D1.4	.703	-.065	-.003	-.099	-.195	-.025	-.313	-.071
D1.7	.696	-.467	.107	.035	-.177	.071	.077	-.002
D1.3	.688	-.200	-.091	.036	.068	.057	-.292	.023
C1.5	.683	-.092	-.125	-.481	-.065	.037	-.085	.004
E1.1	.670	.150	-.469	.089	.067	-.018	-.211	-.179
D1.1	.668	.034	.335	.125	.190	-.072	-.094	-.384
E1.8	.666	-.136	-.220	.023	-.335	.125	.274	-.067
C1.6	.665	-.157	-.186	-.514	-.019	.017	-.032	.188
B1.5	.664	-.049	.191	.281	-.092	.138	.095	.211
D1.5	.664	-.281	.183	.219	-.312	-.093	-.154	.051
C1.4	.657	-.139	-.256	-.425	-.176	.019	.014	-.004
E1.3	.650	-.313	-.100	.134	.302	.092	-.137	.048
E1.2	.644	.046	-.230	.022	-.173	.267	-.304	-.059
C1.7	.639	-.237	.086	-.214	.026	-.074	.279	.017
B1.4	.638	-.189	.214	.272	-.086	-.180	-.027	.201
C1.9	.634	-.187	.063	-.159	.313	-.017	-.169	.097
E1.10	.610	.087	-.149	.019	-.126	.303	.372	-.207
E1.7	.604	.228	-.255	.066	-.115	.051	.366	-.191
C1.8	.603	.015	.476	-.142	.166	-.255	-.050	-.107
B1.7	.597	.240	.221	-.216	.048	-.001	-.065	-.021
B1.6	.580	.218	-.041	.202	-.056	.181	.022	.420
B1.8	.560	.067	-.307	.218	-.003	-.426	-.064	.365
C1.1	.558	.349	.012	-.294	.011	-.099	.028	-.020
E1.4	.552	-.075	-.290	.028	.419	.084	-.022	.227
E1.6	.540	-.110	-.259	.305	.284	-.281	.283	-.155
B1.11	.518	.305	.348	-.228	-.089	.046	.156	.283
E1.11	.517	.125	-.395	.387	.125	-.246	.143	.061
B1.1	.493	.341	.205	.149	-.178	-.027	-.164	-.164
C1.2	.450	.410	.046	-.245	-.045	-.376	.094	-.007
E1.5	.447	.390	-.324	.113	.226	.330	-.267	-.097
B1.3	.415	.566	.178	.165	.051	.131	.004	-.020
C1.3	.538	.544	.061	-.328	.067	-.070	.044	.099
B1.9	.377	-.385	.119	-.155	.245	-.196	.205	.013
B1.10	.239	-.053	.522	.095	.305	.461	.086	.226
B1.2	.433	.309	.210	.439	-.200	-.105	.013	.129

Table 7.17: Total variance explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings	
	Total	% of Variance	Cumulative %	Total	% of Variance
1	8.266	37.573	37.573	8.266	37.573
2	2.047	9.304	46.877	2.047	9.304
3	1.897	8.621	55.498	1.897	8.621
4	1.591	7.232	62.731	1.591	7.232
5	1.040	4.729	67.460		
6	.951	4.321	71.781		
7	.787	3.578	75.360		

Table 7.18: Pattern and Structure matrix for PCA with Promax Rotation of 4-factor solution (showing all values)

Item	Pattern Matrix				Structure Matrix				Comm.
	Component				Component				
	1	2	3	4	1	2	3	4	
D1.5	**.793**	-.187	.128	.084	.792	.208	.420	.348	.672
D1.7	**.759**	-.276	.382	-.034	.783	.152	.589	.291	.768
D1.6	**.758**	-.230	.276	.067	.793	.192	.535	.364	.729
D1.2	**.678**	.224	-.056	.084	.779	.516	.314	.344	.655
B1.5	**.666**	.086	-.102	.178	.720	.382	.257	.382	.554
B1.4	**.654**	-.010	-.047	.235	.709	.312	.300	.432	.548
D1.1	**.629**	.264	-.113	.093	.726	.520	.253	.325	.596
B1.10	**.619**	.205	-.301	-.381	.460	.280	-.134	-.237	.473
C1.8	**.502**	.423	.045	-.136	.654	.615	.322	.153	.581
C1.3	-.184	**.838**	.170	.058	.259	.826	.371	.272	.723
C1.2	-.153	**.648**	.114	.161	.221	.658	.309	.317	.479
C1.1	-.086	**.647**	.206	.081	.298	.693	.397	.292	.528
B1.3	.107	**.645**	-.324	.191	.314	.641	-.015	.268	.503
B1.11	.190	**.613**	.157	-.226	.438	.685	.333	.051	.544
B1.7	.223	**.537**	.174	-.098	.488	.660	.389	.177	.514
C1.6	.009	.162	**.840**	-.055	.396	.405	.872	.304	.786
C1.4	.029	.056	**.839**	.050	.404	.334	.886	.388	.794
C1.5	.064	.209	**.784**	-.047	.451	.461	.855	.321	.781
E1.11	.057	.060	-.139	**.841**	.306	.254	.217	.823	.695
B1.8	.063	.085	.044	**.720**	.356	.306	.365	.779	.625
E1.6	.263	-.079	-.063	**.704**	.438	.191	.282	.748	.609
E1.1	-.013	.159	.248	**.616**	.358	.384	.522	.745	.645

The factor (component) correlation matrix of the EFA (Table 7.19) illustrates a low to moderate correlation among the factors.

Table 7.19: Factor correlation matrix

Component	1	2	3	4
1	1.000	.424	.400	.332
2	**.424**	1.000	.302	.252
3	**.400**	**.302**	1.000	.375
4	**.332**	**.252**	**.375**	1.000

Extraction Method: Principal Component Analysis.
Rotation Method: Promax with Kaiser Normalization.

Though the PCA factor extraction method with Oblique (Promax) rotation has been applied in this EFA, a comparison has also been performed (Table 7.20) applying Maximum Likelihood (MLE) and Principal Axis Factoring (PAF) as factor extraction method with both types of rotation [Orthogonal (Varimax) and Oblique (Promax)] on the retained items (Costello 2005). This shows that PCA with Oblique (Promax) rotation produced a clear factor structure with reasonable factor loadings for most items having very few inflated loadings in comparison to other combinations. Table 7.21 illustrates the final 4-factor extraction (Pattern Matrix) with the retained 22 items statement and their loading to corresponding factor. This Pattern Matrix was later fed to AMOS during Confirmatory Factor Analysis (CFA) to generate a measurement model.

7.5.7 Reliability and validity of EFA results

Each factor had three or more variables (items). Cronbach's Alpha was also checked for each factor to test the reliability of the EFA and this was reported in Table 7.21. High Cronbach's Alphas were found for each factor which ensures the reliability of the EFA.

Table 7.20: A comparative scenario using PCA, MLE and PAF as extraction methods and Varimax (Orthogonal) and Promax (Oblique) as rotation methods (N=101)

Factor extraction method		**Principal Components (PCA)**		**Maximum Likelihood (MLE)**		**Principal Axis Factoring (PAF)**	
Rotation method		**Varimax** (Orthogonal)	**Promax** (Oblique)	**Varimax** (Orthogonal)	**Promax** (Oblique)	**Varimax** (Orthogonal)	**Promax** (Oblique)
Factor	**Item**	**Loadings**					
Factor1	D1.5	.749	**.793**	.768	.854	.721	.784
	D1.7	.729	**.759**	.728	.790	.726	.779
	D1.6	.731	**.758**	.751	.816	.720	.767
	D1.2	.686	**.678**	.623	.610	.647	.651
	B1.5	.653	**.666**	.569	.574	.582	.594
	B1.4	.640	**.654**	.567	.577	.576	.587
	D1.1	.639	**.629**	.556	.531	.584	.581
	B1.10	.523	**.619**	-	-	-	-
	C1.8	.546	**.502**	.525	-	.509*****	-
Factor2	C1.3	.806	**.838**	.759	.819	.786	.832
	C1.2	.632	**.648**	.532	.550	.538	.545
	C1.1	.650	**.647**	.569	.571	.577	.568
	B1.3	.619	**.645**	.520	.561	.517	.542
	B1.11	.635	**.613**	.578	.577	.577	.564
	B1.7	.585	**.537**	.569	.544	.546	.505
Factor3	C1.6	.811	**.840**	.758	.794	.773	.817
	C1.4	.819	**.839**	.812	.857	.794	.835
	C1.5	.773	**.784**	.774	.801	.749	.772
Factor4	E1.11	.807	**.841**	.776	.831	.755	.809
	B1.8	.728	**.720**	.663	.665	.657	.660
	E1.6	.707	**.704**	.617	.611	.624	.623
	E1.1	.662	**.616**	.601	.563	.616	.584

***** Cross loading exits also with factor 2 having loading .503

Table 7.21: Four factors with the retained items and factor loadings

Item	Item statement	Factor (Cronbach's Alpha)				Communalities
		1 (.848)	2 (.828)	3 (.899)	4 (.811)	
D1.5	Opening port as a knowledge centre for interactive learning for regional organisations	.793	-	-	-	.672
D1.7	Providing incentives and support to regional businesses in their early stage	.759	-	-	-	.768
D1.6	Making efforts for capacity enhancement of other regional organisations	.758	-	-	-	.729
D1.2	Demonstrating entrepreneurship for regional innovation to enhance regional competitive advantage	.678	-	-	-	.655
B1.5	Enhancement of social networks with regional stakeholders	.666	-	-	-	.554
B1.4	Nurturing environment	.654	-	-	-	.548
D1.1	Being proactive within the regional networks to exploit the business potential of the region	.629	-	-	-	.596
B1.10	Allowing increased private sector participation in ports	.619	-	-	-	.473
C1.8	Coordinating port-centric logistics networks	.502	-	-	-	.581
C1.3	Developing a flexible structural, functional and planning environment consistent to regional demands	-	.838	-	-	.723
C1.2	Making joint efforts with supply chain actors to increase supply chain efficiency	-	.648	-	-	.479
C1.1	Exchanging information as a pivotal point in supply chain networks	-	.647	-	-	.528
B1.3	Port's financial viability	-	.645	-	-	.503
B1.11	Innovation in the port sector activities	-	.613	-	-	.544
B1.7	Access to funding for port development	-	.537	-	-	.514

Table 7.21: Four factors with the retained items and factor loadings (continued)

Item	Item statement	Factor (Cronbach's Alpha)				Communalities
		1 (.848)	2 (.828)	3 (.899)	4 (.811)	
C1.6	Making continuous efforts to increase the number of collaborative activities with regional organisations	-	-	.840	-	.786
C1.4	Sharing port resources for collaboration with regional organisations	-	-	.839	-	.794
C1.5	Having policy support to be involved in collaborative activities with regional organisations	-	-	.784	-	.781
E1.11	Manage port's own energy consumption nature for improving energy efficiency	-	-	-	.841	.695
B1.8	Publishing annual environmental report indicating trends in port's environmental management performance	-	-	-	.720	.625
E1.6	Improve the environmental standards beyond those required under legislation	-	-	-	.704	.609
E1.1	Enhance corporate social responsibility	-	-	-	.616	.645

The convergent validity of EFA was ensured as the factor loadings of all items were >.5 being highly correlated with the concerned factor. The discriminant validity was confirmed as there was no cross-loading item (Table 7.21) and the correlations among factors (as shown in Table 7.19) did not exceed 0.7 threshold level (Gaskin 2013c). Adequate face validity was observed as the items in each factor were clustered sufficiently from a similar section of the questionnaire (Table 7.21).

7.6 EFA to CFA: The model fit for deciding on factors and relevant strategies

The model fit was then performed on the EFA outcome (4-factor with 22 retained items) to refine and verify the factor structure in order to produce a measurement model (Costello 2005; Saleh 2006; Suhr 2006). The objective for doing a model fit during CFA was to indicate whether the proposed model based on the EFA outcome was a good fit to the observed data.

The model fit is the initial step in the Confirmatory factor analysis (CFA) and can be approached through structural equation modelling (SEM). It addresses the extent of consistency of the sample data with the proposed model (Breckler 1990; Gaskin 2013a). The SPSS based AMOS graphics version 21 of structural equation modelling (SEM) has been used to perform the model fit.

Saleh (2006) identifies three forms of use of SEM in business literature:

- Type 1: measurement model
- Type 2: structural model
- Type 3: combination of measurement and structural parameters for a single analysis

As the web-based questionnaire was not intended to test any hypothesis for structural model, Type 1 was adopted in this case for building and

refining a measurement model based on the pattern matrix developed during EFA with all the retained items shown in Table 7.21 (Barrett 2007; Gaskin 2013a). In addition to data screening during EFA, the missing values at this stage were replaced by the median of the concerned item (as all items were Likert scale responses) prior to performing a model fit. The model fit goes through the process of estimation of SEM which produces 'fit statistics' in its iterative procedures such as regression weights, variances, covariances and correlations. These fit statistics are demonstrated by various fit indices which are evaluated to ensure that the proposed model is a fit to the data (Saleh 2006). There are many fit indices and different researchers prefer different indices as there is no standard rule (Markland 2007; Saleh 2006). A great deal of controversy exits about which fit indices provide the most useful and accurate information (Barrett 2007).

In this context, it is recommended to report a range of indices for model fit (Bentler 1990; Breckler 1990; Byrne 2001). For example, McCoach (2003) recommends commonly used indices such as CFI (Comparative fit index), TLI (Tucker-Lewis index) and RMSEA (Root mean square error of approximation). Steenkamp, Batra and Alden (2003) suggest chi-square, CFI and TLI as model fit measures. Saleh (2006) endorses CMIN/DF (minimum discrepancy/degrees of freedom), IFI (Incremental fit index), TLI, CFI, and RMSEA for evaluating fit indices. Gaskin (2013a) and Schreiber et al. (2006) recommend CMIN/DF, GFI (Goodness-of-fit index), AGFI (Adjusted GFI), CFI, PCFI (Parsimony-adjusted CFI), PCLOSE (test of statistical significance for RMSEA) and RMSEA for model fit measures. McQuitty (2004) favours a group of goodness-of-fit indices which show less sensitivity to sample size. These indices include TLI, IFI, CFI and RMSEA. Taking into account the sample sensitivity and frequent usage of fit indices in literature, this study reports a range of fit indices for model fit which have been shown with their acceptable or threshold levels in Row 1 of Table 7.22.

To perform the model fit the SPSS data was first entered into AMOS. A measurement model was constructed with the four factors of the EFA outcome as latent constructs and 22 retained items as independent variables. Each item was then allowed to load only one factor, in other words regression line was established connecting each item with the concerned factor. The factors were allowed to depict covariances among themselves. The corresponding data was then pulled into each item and the proposed measurement model was tested (Arbuckle 2012; Bollen 1990; Breckler 1990; Gaskin 2013a).

Table 7.22: SEM model fit indices with their acceptable level

		Index							
		CMIN/DF	**p-value**	**GFI**	**CFI**	**IFI**	**TLI**	**PCLOSE**	**RMSEA**
1	**Acceptable level or threshold**	≤ 3 good	>.05	>.95	≥.95 great >.90 traditional	≥.90	≥.90	>.05	<.05 good .05-.10 moderate
	Source: Adopted from Gaskin (2013a), Saleh (2006) and Schreiber et al. (2006)								
2	**Initial findings**	1.889	.000	.756	.842	.846	.821	.000	.094
	χ^2 (22, n=101) = 383, p<0.01, (χ^2/df=1.89)								
3	**Final findings**	1.089	.297	.912	.992	.993	.99	.753	.03
	χ^2 (13, n=101) = 64.279, p=.297, (χ^2/df=1.089)								

Row 2 in Table 7.22 shows the summary of the initial findings. The AMOS output on the initial model fit indices is presented in Tables H-4 (Appendix H). Only CMIN/DF among the fit indices met the threshold. The p-value for the model, GFI, CFI, IFI, TLI and RMSEA did not meet the threshold or acceptable level. Overall, the indices for the initial findings indicated the

model was lagging behind the threshold levels for a good fit. Figure 7.5 presents the initial model (path diagram) with the loading of each item to the concerned factor and the covariances among the factors. Several items were found with low loadings to the concerned factor (<.7) and among several factors high covariances (>.7) were detected which further indicated the poor fit of the model (Gaskin 2013a, 2013d; Tabachnick & Fidell 2007).

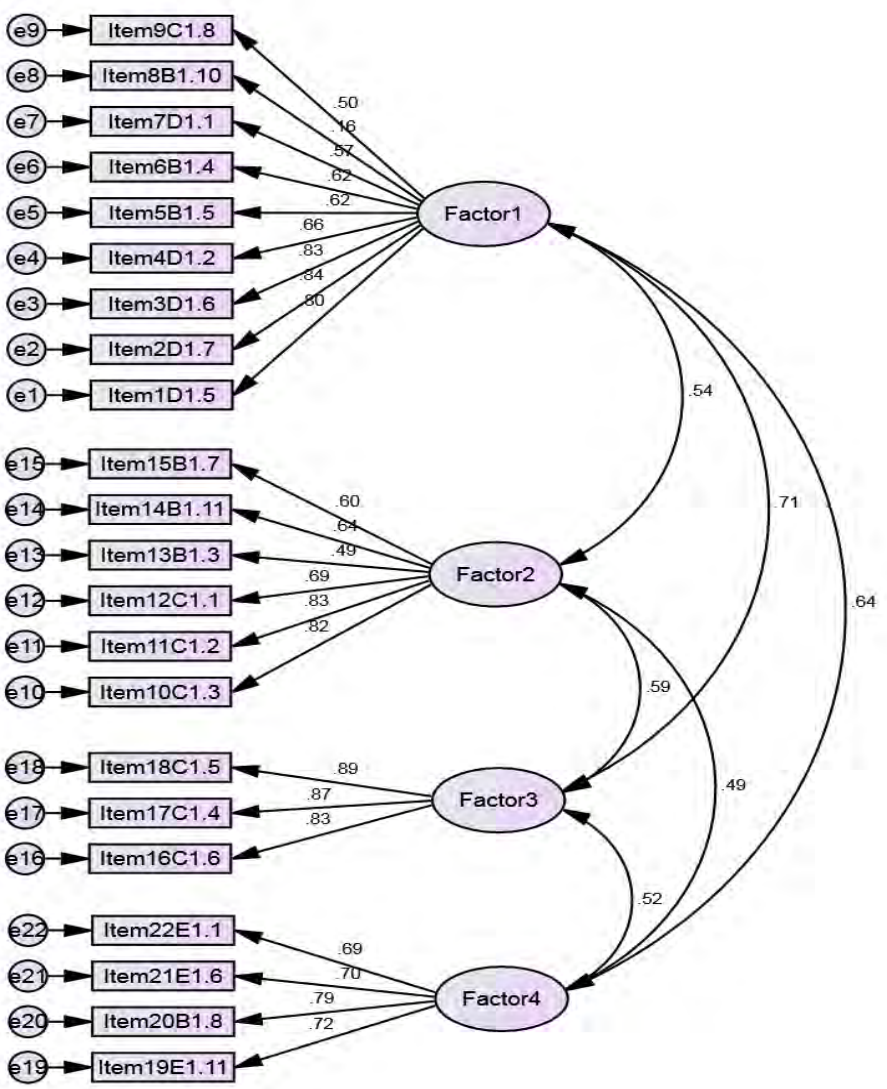


Figure 7.5: Initial path diagram during model fit with loadings (AMOS output)

To address the model fit issues, examination of modification indices generated from the proposed model analysis, elimination of items with low

loadings and examination of standardised residual covariances were performed which suggested a revised (final) measurement model (Figure 7.6). The fit indices obtained from the revised model indicated that it provided a better fit to the data as all fit indices, except GFI (at a tolerable level), met the threshold levels (Row 3 in Table 7.22). The detail of the final model fit indices is presented in Table H-5 (Appendix H).

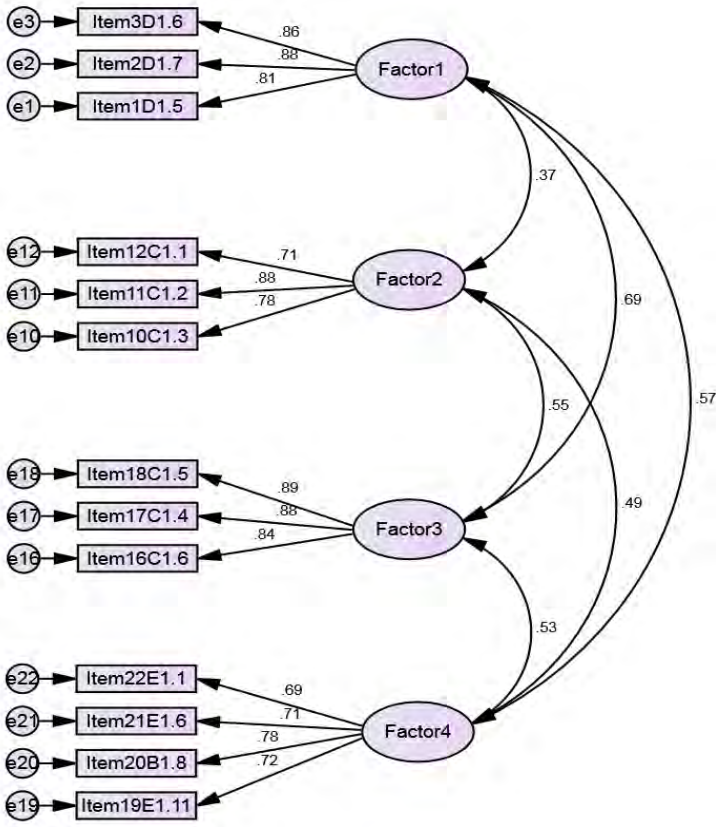


Figure 7.6: Final measurement model (path diagram) (AMOS output)

In the process of model fit, 9 items were excluded from the initial (individual) model to achieve a better fit to the data. The improved fit indices and reduced χ^2 value in the final model justified the deletion of 9

items. The final measurement model indicated the directionality of the relationship between items and factors (Figure 7.6).

All items were positively correlated with their corresponding factors. The items were loaded sufficiently onto their respective factors, and supported the construct validity of the model. The final CFA outcome is presented in Table 7.23.

The four factors of the final CFA have been labelled in accordance to the strengths of the retained items corresponding to each factor and the overall context of the data integration (in the light of preceding EFA and qualitative telephone interview outcomes). The high item loadings/ regression weight indicate an unequivocal agreement about the factors and their relevant items across all port stakeholder respondents. The high squared multiple correlations of all items with the corresponding factors illustrate the predictability of the factors by the items. The high Cronbach's Alpha indicates the general reliability of the outcomes.

7.6.1 Reliability and validity of CFA

There are several measures to examine the reliability and validity of CFA, including convergent validity and discriminant validity. The reliability and validity measures of CFA mainly include composite reliability (CR), average variance extracted (AVE), maximum shared variance (MSV), and average shared variance (ASV) (Hair et al. 2010). The thresholds for these reliability and validity measures are shown in Table 7.24.

The excel based stats tools package (Gaskin 2013a) was used to investigate the reliability and validity measures of CFA. The AMOS outputs on correlations and standardised regression weights of the final measurement model were inserted into the stats tools package to examine the reliability and validity of the CFA.

Table 7.23: The final CFA outcome (measurement model in table)

Factor No.	*Cronbach's Alpha	Factor label	Item	**Item loadings/Regression Weight (Squared multiple correlations)** *All port stakeholders
1	.875	Being interactive and entrepreneurial port in the RIS	**D1.5:** Opening port as a knowledge centre for interactive learning for regional organisations	.81 (.66)
			D1.7: Providing **incentives** and support to regional businesses in their early stage	.88 (.77)
			D1.6: Making efforts for capacity enhancement of other regional organisations	.86 (.73)
2	.765	Collaboration for supply chain efficiency	**C1.3:** Developing a flexible structural, functional and planning environment consistent to regional demands	.78 (61)
			C1.2: Making joint efforts with supply chain actors to increase supply chain efficiency	.88 (.77)
			C1.1: Exchanging information as a pivotal point in supply chain networks	.71 (.51)
3	.899	Collaboration with regional organisations	**C1.6:** Making continuous efforts to increase the number of collaborative activities with regional organisations	.84 (.70)
			C1.4: Sharing port resources for collaboration with regional organisations	.88 (.77)
			C1.5: Having policy support to be involved in collaborative activities with regional organisations	.89 (.79)
4	.818	Being pro-active for port's environmental challenges and social responsibility	**E1.11:** Manage port's own energy consumption nature for improving energy efficiency	.72 (.51)
			B1.8: Publishing annual environmental report indicating trends in port's environmental management performance	.78 (.61)
			E1.6: Improve the environmental standards beyond those required under legislation	.71 (.50)
			E1.1: Enhance corporate social responsibility	.69 (.48)

Table 7.24: Threshold levels of reliability and validity measures for CFA

Measure	**Threshold**	**Issue if not meeting threshold**
Composite reliability **(CR)**	>0.7 [for reliability] and CR> (AVE) [for convergent validity]	Reliability and Convergent validity
Average variance extracted **(AVE)**	>0.5	Convergent validity
Maximum shared variance **(MSV)**	MSV<AVE	Discriminant validity
Average shared variance **(ASV)**	ASV<AVE	Discriminant validity

Source: Hair et al. (2010)

Table 7.25 illustrates those reliability and validity measures. The last four columns of Table 7.25 show the correlations among the four factors. The correlation coefficients among the four factors do not exceed 0.7, meaning that the discriminant validity among the factors is supported and the model performs well in terms of testing in different settings (Gaskin 2013a; Saleh 2006).

Table 7.25: Reliability, validity, and factor correlation matrix with square root of the AVE on the diagonal

	CR	AVE	MSV	ASV	Factor 4	Factor 2	Factor 1	Factor 3
Factor 4	0.815	0.524	0.320	0.279	**0.724**			
Factor 2	0.835	0.629	0.304	0.226	0.490	**0.793**		
Factor 1	0.886	0.721	0.482	0.312	0.566	0.367	**0.849**	
Factor 3	0.901	0.752	0.482	0.354	0.527	0.551	0.694	**0.867**

The composite reliability (CR) scores of the factors were greater than 0.7, indicating that the items are reliable enough to measure the corresponding construct (factor). Regarding convergent validity, each CR score was greater than the corresponding average variance extracted (AVE) in the diagonal and the AVE of each factor was greater than 0.5, meaning that there is no convergent validity issue with the items with respect to corresponding factors. The maximum shared variance (MSV) and average shared variance (ASV) of each factor were smaller than the AVE, showing that discriminant validity among the factors examined is supported.

The following two sections are discussions of findings. Section 7.7 discusses the final CFA results including labelling the four pertinent factors and strategic initiatives for ARPs; and section 7.8, integrating the results of quantitative and qualitative data analysis, further discusses how ARPs are involved in regional development in terms of the dimensions and approaches stated in Chapter 2.

7.7 Pertinent factors and strategic initiatives for ARPs

Based on the CFA results in Table 7.23, the four pertinent factors affecting the strategies for ARPs' involvement in regional development are labelled and discussed below. These pertinent factors are:

1) Being an interactive and entrepreneurial port in the RIS,
2) Collaboration for supply chain efficiency,
3) Collaboration with regional organisations, and
4) Being pro-active for port's environmental challenges and social responsibility.

The corresponding items of these pertinent factors with their reality and relevancy indicate the strategies for ARPs to be involved in regional development.

7.7.1 First factor and relevant strategies: Being an interactive and entrepreneurial port in the RIS

This factor consists of items D1.5 (Opening port as a knowledge centre for interactive learning for regional organisations), D1.7 (Providing incentives and support to regional businesses in their early stage) and D1.6 (Making efforts for capacity enhancement of other regional organisations). These three items were from question D1 on 'ARPs participation in the regional innovation system'. All item loadings to the factor were above 0.80 with D1.7 having the highest loading of 0.88. The high squared multiple correlations of all items show the factor is well predicted by the items (Table 7.23). The Cronbach's Alpha of the factor was 0.875. Moreover, the items were focused on ARPs' openness, interactive learning opportunities, business incubation (helping regional business in their infancy) and efforts for capacity enhancement. It is essential that ports should remain focused on the commercial benefits while pursuing these strategies.

Table 7.23 also shows that item D1.5 of this factor received a relatively low loading from the port policy and planning contributor respondents (that is, Stratum 2). This indicates that ports should be more interactive with port policy and planning contributors, whereas the port policy and planning contributors also need strategies to support the ARPs to be interactive and innovative.

The ARPs need to be interactive, entrepreneurial and innovative in helping regional businesses, particularly those businesses in their early stages. The EFA outcomes showed that the survey respondents expressed in favour of ARPs' necessity to be entrepreneurial and innovative for regional competitive advantage (Item D1.2- Mean 3.95, EFA factor loading 0.678), connect effectively with social networks with regional stakeholders (Item B1.5- Mean 3.53, EFA factor loading 0.666), coordinate port-centric logistics networks (C1.8- Mean 4.07, EFA factor loading 0.502), and promote private sector participation in ports (Item B1.10- Mean 3.63, EFA factor loading 0.619).

A comment from one telephone interview participant (TIP) supported this perspective:

> *We are seeing an enormous amount of innovation coming in through the leadership of the new private owners of (name of three ports). But, most other ports lack innovation, drive and the desire to engage in regional innovation or regional development.*
>
> *-TIP #08*

An entrepreneurial port needs to look beyond infrastructure in exploiting the available knowledge in the port community and binding regions to the port (Van Winden & Van Klink 1998). The entrepreneurial factor is important for ARPs to utilise the knowledge base of the port community. ARPs need to be interactive, organised and innovative for storing, linking and transforming the knowledge of various actors in the region. Collaboration, or joint activity, is a critical way forward which has been

clearly captured as the next two factors in CFA outcomes. The broad environment of collaboration creates a supportive space for entrepreneurship and regional development (Florida 2002).

7.7.2 Second factor and relevant strategies: Collaboration for supply chain efficiency

The second factor consists of items C1.1 (Exchanging information as a pivotal point in supply chain networks), C1.2 (Making joint efforts with supply chain actors to increase supply chain efficiency) and C1.3 (Developing a flexible structural, functional and planning environment consistent to regional demands). These items were clustered from question C1 on building collaborative advantages. Among the items, C1.2 has the highest loading factor (0.88) and highest squared multiple correlation (0.77). These items focused on systemic supply chain efficiency of ports in catering to regional demands. Consequently, the factor is labelled as 'collaboration for supply chain efficiency'. The internal port stakeholders (Stratum 1 respondents/Port officials) significantly supported the ports' collaboration strategy for supply chain efficiency (Table 7.23).

According to EFA outcomes, the joint efforts of supply chain actors for efficient supply chains (Item C1.2- Mean 4.25, EFA factor loading 0.648), groups with the same factor along with ports' financial viability (Item B1.3- Mean 4.45, EFA factor loading 0.645), innovation in port sector activities (Item B1.11- Mean 4.25, EFA factor loading 0.613) and easily accessible port development funding (Item B1.7- Mean 4.30, EFA factor loading 0.537), indicates that supply chain efficiency is essential for ensuring a port's financial viability. Supply chain collaboration as a way to serve the region while ensuring financial viability of ports was reflected in the EFA factor grouping. In this regard, comments from an interview participant and a survey respondent (both external port stakeholders) are noted:

(ARPs) are not making a profit; they are not financially sound. How can these ports be economic leaders and bring benefits and serve their regions (for supply chain efficiency)?

-TIP #08

If the port had a bigger picture approach, then everyone would benefit and while the port should engage in supply chain efficiencies.

-Survey Respondent # 20

A port is a pivotal platform in integrating the supply chain that runs through the port where partnerships and collaboration are critical (Almotairi & Lumsden 2009; Bichou & Gray 2004). Collaboration increases supply chain performance and enhances competitive advantage (Betts 2009) which brings growth to the region. Joint efforts and planning consistent with regional demands, shared goals to increase supply chain efficiency, and information sharing to build trust are important elements for effective collaboration (Kohli & Jensen 2010).

7.7.3 Third factor and relevant strategies: Collaboration with regional organisations

The third factor consists of items C1.4 (Sharing port resources for collaboration with regional organisations) C1.5 (Having policy support to be involved in collaborative activities with regional organisations) and C1.6 (Making continuous efforts to increase the number of collaborative activities with regional organisations). Like factor 2, all of these items were clustered from question C1 on building collaborative advantages. But these items mainly focused on collaboration with regional organisations. Items C1.5 and C1.4 have loadings of 0.89 and 0.88 and squared multiple correlation 0.79 and 0.77 respectively. Ports require policy support, continuous effort to increase collaboration and, more importantly, sharing resources for mutual benefit. The underlying objective of this factor is the

co-development of both ports and their regions, which has been reflected in one respondent's comment:

> *As a key stakeholder in regional development it is appropriate that the port engage with others (regional organisations). Our port does not collaborate. This is a fundamental problem, but its mandate is to take care of port business not advocate for the whole supply chain. Acting in isolation is a weakness.*
>
> *-Survey Respondent # 20*

This third factor and its structure were quite consistent during EFA and CFA with high item loadings (Table 7.21 and 7.23) and high Cronbach's Alpha (0.899), indicating the reliability and agreement about the factor across survey respondents. Enhancing capacity, sharing resources to achieve a common purpose and regional development through co-development of both port and region, are the focus of this factor. The development of a port and its region should be considered as a whole (Ferrari et al. 2012; Haralambides 1997; Li, Lu & Xiang 2008; Maudrich 2000). The co-development of business opportunities amongst ARPs and other regional organisations is valuable for the regional economy (Pallis 2013a), thereby generating a positive impact on regional development.

7.7.4 Fourth factor and relevant strategies: Being pro-active for port's environmental challenges and social responsibility

The environmental challenges, in addition to economic impacts, have become a major issue requiring the attention of port management (Li, Lu & Xiang 2008). This has been captured in the fourth factor of the CFA. The fourth factor consists of items E1.1 (Enhance corporate social responsibility), E1.6 (Improve environmental standards beyond those required under legislation), B1.8 (Publish annual environmental reports indicating trends in port's environmental management performance) and E1.11 (Manage port's own energy consumption nature for improving

energy efficiency). The common focus of these items was the port's environmental management performance and social responsibility. The items covered the environmental and social aspects of port sustainability. The corporate social responsibility of ports has economic, social and environmental elements which need to be enhanced. Item B1.8 had the highest loading factor (.78) and squared multiple correlation (.61). No significant difference was found for item loadings and squared multiple correlations across the strata of the respondents. This fourth factor and its structure were also consistent during EFA and CFA (Table 7.21 and 7.23) with high Cronbach's Alpha (0.818) showing the reliability and consistency of the factor across survey respondents.

The environmental challenges for Australian ports are unique as 12 ARPs (Gladstone, Abbot Point, Hay Point, Townsville, Cairns, Cape Flattery, Mourilyan, Lucinda, Mackay, Alma (Rockhampton), Cooktown and Quintell Beach) are situated adjacent to World Heritage Areas (GBRMPA 2013; GHD 2013). The pro-activeness of ARPs to meet environmental challenges and to perform social responsibility is the key to enhancing the contribution of ports to regional development. Strong regulation, policy and governance arrangements and rigorous planning, and stakeholder and community engagement to avoid and mitigate environmental impacts are the primary driving factors in this regard (GHD 2013).

7.7.5 Correlations and covariances among pertinent factors for regional development

A covariance shows the trend in the linear relationship between the variables, whereas a correlation explains the strength of the linear relationship between two variables rather than the causation relationship (Rovai, Baker & Ponton 2013). The correlations among factors after EFA and CFA are shown in Table 7.19 and Table 7.25. Table 7.26 further presents a comparative scenario of correlations to highlight the strengths of relationships between the factors. The factors showed low to moderate

correlations within the threshold level (<.7). After CFA, the correlations between factor 1 and 2 decreased while in other factors it has increased, but did not cross the threshold level.

Factor 1 shows comparatively high correlations with factors 3 and 4. The high correlation between factor 1 and factor 3 indicates that collaboration with regional organisations is essential for ports to be interactive and entrepreneurial in the regional innovation system.

Table 7.26: Correlations among factors after EFA and CFA

Factor	**Correlation after CFA*** (Correlation after EFA)			
	1	**2**	**3**	**4**
1	1			
2	**0.367** (0.424)	1		
3	**0.694** (0.400)	**0.551** (0.302)	1	
4	**0.566** (0.332)	**0.490** (0.252)	**0.527** (0.375)	1
*Correlations between factors 1&3>1&4>2&3>3&4>2&4>1&2				

On the other hand, the ARPs need to be interactive and entrepreneurial for RIS without compromising the ports' environmental and social responsibilities; this has been reflected with a moderately high correlation between factors 1 and 4. A port's image within the community and amongst its stakeholders can be enhanced through innovation and increased proactivity towards environmental challenges and social responsibility and by adopting a more entrepreneurial approach to the RIS.

A moderate correlation exists between factors 2 and 3 revealing that collaboration for supply chain efficiency and collaboration with regional organisations are interrelated. The moderate correlations between factors 3 and 4 and between factors 2 and 4 show that environmental and social dimensions of port sustainability (Factor 4) have reasonable connections with the economic dimension expressed by the collaboration for supply

chain efficiency (Factor 2) and collaboration with regional organisations (Factor 3). A low correlation between factors 1 and 2 reveals that ports entrepreneurial participation in the RIS and collaboration for supply chain efficiency has relatively weak interrelation. However, both strategic factors may add to port and region co-development as relatively high correlations exist between factors 1 and 3 and factors 2 and 3.

In the conceptual model generated in the qualitative strand (Section 6.6.4), there were three strategic factors: 1) port sustainability, 2) building collaborative advantages, and 3) active participation of ports in the RIS. The correlations mentioned above were also found in the conceptual model among these three strategic factors, but the strength of those correlations was not clear. The quantitative results complemented the correlations among the factors, though the number of factors increased from 3 to 4 and provided a more specific picture of factor structure in the final CFA outcome (measurement model). The CFA results revealed that these factors appeared as four explicit strategic directions, where interactive and entrepreneurial characteristics of ports were more specific for ports' active participation in the RIS. 'Building collaborative advantages' was split into 'collaboration for supply chain efficiency' and 'collaboration with regional organisations' and the economic dimension of port sustainability remained latent in every factor, leaving port environmental and social responsibilities as a more specific strategic factor. The comparative pictures of covariances among the factors across the three surveyed strata are presented in Table 7.27.

The covariance between factor 2 and 3 for port officials (stratum 1) was negative, which revealed that port officials assumed 'collaboration for supply change efficiency' and 'collaboration with regional organisations' may have an opposite trend of variation. In other words, the greater involvement of ports in 'collaboration for supply chain efficiency' would

leave little scope for involvement in 'collaboration with regional organisations'.

Table 7.27: Covariances among the four factors across port stakeholder

Between factors	Covariances				
	All respondents	Port officials / **Internal port stakeholders (Stratum 1)**	Port policy and planning contributors **(Stratum 2)**	Port users **(Stratum 3)**	**External port stakeholders (Stratum 2 + 3)**
Factor 1 ↔ Factor 2	.37	.07	.40	.48	.41
Factor 1 ↔ Factor 3	.69	.44	.85	.69	.74
Factor 1 ↔ Factor 4	.57	.31	.47	.69	.61
Factor 2 ↔ Factor 3	.55	-.06	.64	.73	.66
Factor 2 ↔ Factor 4	.49	.50	.29	.55	.46
Factor 3 ↔ Factor 4	.53	.59	.23	.57	.47

7.7.6 Comparison of the final CFA outcomes across strata

The final CFA outcome in a comparative scenario among the port stakeholder strata is presented in Table 7.28. Although a clear agreement exists about the factors and their relevant items across port stakeholder respondents, little difference in terms of importance/agreement over the items is apparent across the strata. Among the three items of factor 1 (Being interactive and entrepreneurial port in the RIS), the highest level of importance (RW 0.90) to item D1.7 (Providing incentives and support to regional businesses in their early stage, (RW 0.90) was given by both the port officials (stratum 1) and port users (stratum 3). The lowest level of importance (RW 0.69) to item D1.5 (Opening port as a knowledge centre for interactive learning for regional organisations) was given by stratum 2 (port policy and planning contributors). The port users (stratum 3) placed the highest level of importance on items D1.5 (Opening port as a knowledge centre for interactive learning for regional organisations, RW 0.86) and D1.6 (Making efforts for capacity enhancement of other regional organisations, RW 0.89). Overall, the port users (stratum 3) placed the highest importance on all items, while the port policy and planning contributors (stratum 2) placed the lowest importance on all items of this factor.

Table 7.28: The final CFA outcomes across strata

Factor No.	Factor label	Item	Item loadings (Regression Weight) (Squared multiple correlations)		
			Port officials (Stratum 1)	Port policy and planning contributors (Stratum 2)	Port users (Stratum 3)
1	Being interactive and entrepreneurial port in the RIS	**D1.5:** Opening port as a knowledge centre for interactive learning for regional organisations	.80 (.63)	.69 (.47)	.86 (.75)
		D1.7: Providing incentives and support to regional businesses in their early stage	.90 (.82)	.84 (.71)	.90 (.82)
		D1.6: Making efforts for capacity enhancement of other regional organisations	.87 (.76)	.76 (.57)	.89 (.78)
2	Collaboration for supply chain efficiency	**C1.3:** Developing a flexible structural, functional and planning environment consistent to regional demands	.65 (.43)	.64 (.41)	.84 (.70)
		C1.2: Making joint efforts with supply chain actors to increase supply chain efficiency	1.02 (1.04)	.71 (.51)	.93 (.86)
		C1.1: Exchanging information as a pivotal point in supply chain networks	.76 (.58)	.81 (.66)	.77 (.60)
3	Collaboration with regional organisations	**C1.6:** Making continuous efforts to increase the number of collaborative activities with regional organisations	.61 (.37)	.88 (.77)	.90 (.81)
		C1.4: Sharing port resources for collaboration with regional organisations	.84 (.71)	.90 (.80)	.89 (.79)
		C1.5: Having policy support to be involved in collaborative activities with regional organisations	.87 (.76)	.89 (.79)	.87 (.76)
4	Being pro-active for port's environmental challenges and social responsibility	**E1.11:** Manage port's own energy consumption nature for improving energy efficiency	.81 (.66)	.62 (.39)	.75 (.56)
		B1.8: Publishing annual environmental report indicating trends in port's environmental management performance	.74 (.55)	.84 (.71)	.79 (.62)
		E1.6: Improve the environmental standards beyond those required under legislation	.57 (.32)	.51 (.26)	.82 (.67)
		E1.1: Enhance corporate social responsibility	.70 (.49)	.44 (.19)	.83 (.69)

Among the three items of factor 2 (Collaboration for supply chain efficiency), the port officials (stratum 1) gave the highest level of importance to item C1.2 (Making joint efforts with supply chain actors to increase supply chain efficiency, RW 1.02), while the port policy and planning contributors (stratum 2) gave the lowest level of importance to item C1.3 (Developing a flexible structural, functional and planning environment consistent to regional demands, RW 0.64). Items C1.3 and C1.1 (Exchanging information as a pivotal point in supply chain networks) received the highest levels of importance (RW 0.84 and 0.81) from strata 3 and 2 respectively. Overall, the importance of joint efforts for supply chain efficiency is well agreed across the strata. Although the need for information exchange has been recognised by port policy and planning contributors, their support for the development of a flexible and consistent operational environment for ARPs is essential.

Among the three items of factor 3 (Collaboration with regional organisations), the port officials (stratum 1) showed the lowest level of importance for all three items. The port users (stratum 3) gave the highest level of importance (RW 0.90) to item C1.6 (Making continuous efforts to increase the number of collaborative activities with regional organisations). The port policy and planning contributors (stratum 2) gave highest level of importance to items C1.4 (Sharing port resources for collaboration with regional organisations, RW 0.90) and C1.5 (Having policy support to be involved in collaborative activities with regional organisations, RW 0.89). All three strata agreed with item C1.5 assigning it a similar level of importance with negligible difference. This was reflected by the regression weights (RW) 0.87 (stratum 1), 0.89 (stratum 2) and 0.87 (stratum 3). Among the four factors of CFA, factor 3 had the highest Cronbach's Alpha (0.899). One reason why port officials assigned a relatively low level of importance to all items of this factor might be due to the lack of policy support for involvement in collaborative activities with regional organisations, for example, item C1.5 to which all strata assigned similar

levels of importance. The codes C39 (poor financial condition of regional ports) and C38 (lack of leadership), which appeared in the qualitative strand, might be the other reasons.

Among the four items of factor 4 (Being pro-active for port's environmental challenges and social responsibility), item B1.8 (Publishing annual environmental reports indicating trends in port's environmental management performance) received the highest level of importance (RW 0.84) from the port policy and planning contributors (stratum 2). Item E1.1 (Enhance corporate social responsibility) received the lowest level of importance (RW 0.44) from the same stratum. The port officials (stratum 1) showed the highest level of agreement to item E1.11 (Manage port's own energy consumption nature for improving energy efficiency, RW 0.81) and port users (stratum 3) showed the highest levels of importance to item E1.6 (Improve the environmental standards beyond those required under legislation, RW 0.82) and E1.1 (RW 0.83). Overall, the ARPs need to be proactive in addressing ports' environmental challenges and social responsibilities. The environmental management reporting of ports was seen across all strata as an important tool in assessing ARPs environmental management performance.

7.8 ARPs' strategies to regional development

By integrating the qualitative and quantitative results, this section aims to answer the explicit mixed methods research question: 'How can Australian regional ports effectively contribute to regional development?' The links between ARPs' strategies and the dimensions and approaches of regional development are discussed.

7.8.1 ARPs strategies and regional development dimensions

Regional development in a national context has four general dimensions: social, economic, environmental and spatial (discussed in Chapter 2,

Table 2.2). Though these dimensions may have interrelating issues, from regional ports' standpoint, the important elements for each dimension are outlined as follows:

1) Social dimension
- Social responsibilities of the organisations and acceptance for organisational activities in society
- Enhanced links with social networks
- Pattern of interaction and coordination
- Mutual capacity enhancement of regional organisations

2) Economic dimension
- Business viability
- Supply chain efficiency
- Entrepreneurship and innovation
- Regional competitive advantage
- Organisational collaborations
- Optimisation of public-private partnership

3) Environmental dimension
- Environmental sustainability, awareness, protection, and overall environmental management

4) Spatial dimension
- Pro-activeness for regional innovation system
- Policy and long term planning consistent with regional settings
- Participation in regional resource configuration
- Sharing resources for mutual interest, identification of regional niches and working to capitalise on those resources

In Table 7.29, the outcomes of qualitative and quantitative strands regarding the strategic initiatives for ARPs' involvement in regional development are integrated along regional development dimensions mentioned above:

Table 7.29: The ARPs' involvement in regional development

RD dimension→ **Analysis outcome ↓**	**Social (So)**	**Economic (Ec)**	**Environmental (En)**	**Spatial (Sp)**
Qualitative strand		**(Total frequency of codes directly contributed to composite themes)**		
Conceptual model (Thematic analysis)	-Exchanging information as a network conduit **(38)** -Enhancing social capital **(35)** -Opening port as an interactive learning platform **(22)** -Working for capacity enhancement of regional organisations **(20)**	-Joint efforts for supply chain efficiency **(40)** -Public-private partnership **(31)** -Entrepreneurship for regional innovation and regional competitive advantage **(23)** -Business viability **(19)** -Risk taking attitudes **(11)** -Enhanced public-private partnership **(7)**	-Nurturing environment **(29)**	-Proactive leadership for RIS **(40)** -Sharing resources for collaboration **(37)** -Long term plan **(33)** -Participation in regional resource configuration **(30)** -Policy support for collaborative activities **(10)** -In-house planning capability**(4)**
Quantitative strand	**(FL-Factor loading)**			
Pattern matrix (EFA)	D1.5-Opening port as a knowledge centre for interactive learning for regional organisations**(FL: 0.793)** D1.6-Making efforts for capacity enhancement of other regional organisations **(FL: 0.758)** B1.5-Enhancement of social networks with regional stakeholders **(FL: 0.666)** C1.1-Exchanging information as a pivotal point in supply chain networks **(FL: 0.647)**	C1.6-Making continuous efforts to increase the number of collaborative activities with regional organisations **(FL: 0.840)** D1.7-Providing incentives and support to regional businesses in their early stage **(FL: 0.759)** D1.2-Demonstrating entrepreneurship for regional innovation to enhance regional competitive advantage **(FL: 0.678)** C1.2-Making joint efforts with supply chain actors to increase	E1.11-Manage port's own energy consumption nature for improving energy efficiency **(FL: 0.841)** B1.8-Publishing annual environmental report indicating trends in port's environmental management performance **(FL: 0.720)** E1.6-Improve the environmental standards beyond those required under legislation **(FL:**	C1.4-Sharing port resources for collaboration with regional organisations **(FL: 0.839)** C1.5-Having policy support to be involved in collaborative activities with regional organisations **(FL: 0.839)** C1.3-Developing a flexible structural, functional and planning environment consistent to regional demands **(FL: 0.838)**

RD dimension→ Analysis outcome ↓	Social (So)	Economic (Ec)	Environmental (En)	Spatial (Sp)
	E1.1-Enhance corporate social responsibility **(FL: 0.616)** C1.8-Coordinating port-centric logistics networks **(FL: 0.502)**	supply chain efficiency **(FL: 0.648)** B1.3-Port's financial viability **(FL: 0.645)** B1.10-Allowing increased private sector participation in ports **(FL: 0.619)** B1.7-Access to funding for port development **(FL: 0.537)**	**0.704)** B1.4-Nurturing environment **(FL: 0.654)**	D1.1-Being proactive within the regional networks to exploit the business potential of the region **(FL: 0.629)** B1.11-Innovation in the port sector activities **(FL: 0.613)**
	(RW-Regression Weight)			
Measurement model (CFA)	D1.6-Making efforts for capacity enhancement of other regional organisations **(RW: 0.86)** D1.5-Opening port as a knowledge centre for interactive learning for regional organisations **(RW: 0.81)** C1.1-Exchanging information as a pivotal point in supply chain networks **(RW: 0.71)** E1.1-Enhance corporate social responsibility **(RW: 0.69)**	C1.2-Making joint efforts with supply chain actors to increase supply chain efficiency **(RW: 0.88)** D1.7-Providing incentives and support to regional businesses in their early stage **(RW: 0.88)** C1.6-Making continuous efforts to increase the number of collaborative activities with regional organisations **(RW: 0.84)**	B1.8-Publishing annual environmental report indicating trends in port's environmental management performance **(RW: 0.78)** E1.11-Manage port's own energy consumption nature for improving energy efficiency **(RW: 0.72)** E1.6-Improve the environmental standards beyond those required under legislation **(RW: 0.71)**	C1.5-Having policy support to be involved in collaborative activities with regional organisations **(RW: 0.89)** C1.4-Sharing port resources for collaboration with regional organisations **(RW: 0.88)** C1.3-Developing a flexible structural, functional and planning environment consistent to regional demands **(RW: 0.78)**

(Continuation from previous pages)

7.8.1.1 ARPs strategies along social dimension

In terms of social dimension, the final CFA outcome (measurement model) showed item D1.6 (Making efforts for capacity enhancement of other regional organisations) with the highest regression weight (0.86) followed by items D1.5 (Opening port as a knowledge centre for interactive learning for regional organisations), C1.1 (Exchanging information as a pivotal point in supply chain networks) and E1.1 (Enhancing corporate social responsibility) with regression weights 0.81, 0.71 and 0.69 respectively. The EFA outcome in relation to the social dimension showed item D1.5 (Opening port as a knowledge centre for interactive learning for regional organisations) with the highest factor loading (0.793), followed by D1.6 (Making efforts for capacity enhancement of other regional organisations), B1.5 (Enhancement of social networks with regional stakeholders), C1.1 (Exchanging information as a pivotal point in supply chain networks), E1.1 (Enhance corporate social responsibility) and C1.8 (Coordinating port-centric logistics networks) with factor loadings 0.758, 0.666, 0.647, 0.616 and 0.502 respectively. Items B1.5 and C1.8 are related to basic port activities that contribute to the social dimension within the port periphery.

The qualitative outcomes, in terms of composite themes (CT), showed that exchanging information as a network conduit (CT6), enhancing social capital (CT4), working for capacity enhancement of regional organisations (T12) and opening a port as an interactive learning platform (CT15) support the quantitative outcomes that define the social dimension.

Accordingly, opening a port as a knowledge centre for interactive learning was strongly supported in both the qualitative and quantitative strands. Helping to enhance the capacity of regional organisations, increasing activities related to corporate social responsibility and enhancing social networks amongst regional stakeholders were all seen as important for ARPs as these activities can enhance the port's social capital, an important pre-requisite for regional development.

With regard to the social dimension of regional development, both internal and external stakeholders strongly supported the capacity enhancement of other regional organisations and the opening of ports as interactive learning centres for regional organisations (Table 7.30).

Table 7.30 Social dimension related items extracted during CFA

Item	Regression weight (Squared multiple correlations)	
	Internal port stakeholders	External port stakeholders
D1.6 Making efforts for capacity enhancement of other regional organisations	.87 (.76)	.84 (.71)
D1.5 Opening port as a knowledge centre for interactive learning for regional organisations	.80 (.63)	.80 (.64)
C1.1 Exchanging information as a pivotal point in supply chain networks	.76 (.58)	.74 (.55)
E1.1 Enhance corporate social responsibility	.70 (.49)	.68 (.46)

7.8.1.2 ARPs strategies along economic dimension

In terms of the economic dimension, the CFA extracted items C1.2 (Making joint efforts with supply chain actors to increase supply chain efficiency), D1.7 (Providing incentives and support to regional businesses in their early stage) and C1.6 (Making continuous efforts to increase the number of collaborative activities with regional organisations) with the regression weights 0.88, 0.88 and 0.84 respectively. To implement these strategic initiatives, ARPs require a solid financial base where entrepreneurship, innovation and public-private partnerships are important elements. This was reflected in the EFA and telephone interview outcomes.

In the EFA, besides C1.2, D1.7 and C1.6, items considered relevant to the economic dimension were D1.2 (Demonstrating entrepreneurship for regional innovation to enhance regional competitive advantage), B1.3 (Port's financial viability), B1.10 (Allowing increased private sector

participation in ports) and B1.7 (Access to funding for port development) each with factor loadings more than 0.5.

During the telephone interviews, joint efforts for supply chain efficiency (CT7), entrepreneurship and innovation (CT13) through enhanced public-private partnership (CT5) with a focus to achieve ports' business viability (CT2) and regional competitive advantage (CT12) were highlighted. These factors were considered to be significant for ports' economic contribution to regional development.

The internal port stakeholders highlighted joint efforts for supply chain efficiency and supporting early stage regional businesses (that is, business incubation). However they showed less interest in instilling collaborative efforts as regular port activities (C1.6), while the external stakeholders were in favour of the collaborative activities of ports (Table 7.31).

Table 7.31 Economic dimension related items extracted during CFA

Item	**Regression weight (Squared multiple correlations)**	
	Internal port stakeholders	External port stakeholders
C1.2 Making joint efforts with supply chain actors to increase supply chain efficiency	1.02 (1.04)	.86 (.73)
D1.7 Providing incentives and support to regional businesses in their early stage	.90 (.82)	.87 (.76)
C1.6 Making continuous efforts to increase the number of collaborative activities with regional organisations	.61 (.37)	.89 (.79)

7.8.1.3 ARPs strategies along the environmental dimension

The ARPs strategies along the environmental dimension were not evident during the telephone interviews, with only a basic indication to nurture ports' environmental responsibilities (CT3). During the EFA and CFA, those strategic initiatives were more clearly defined.

Items E1.11 (Manage port's own energy consumption nature for improving energy efficiency), B1.8 (Publishing annual environmental report indicating trends in port's environmental management performance), E1.6 (Improve the environmental standards beyond those required under legislation) and B1.4 (Nurturing environment) in the EFA were found to be relevant to the environmental dimension. Items E1.11, B1.8 and E1.6 had factor loadings 0.841, 0.720, and 0.704 respectively, indicating strong strategic directives for the ARPs.

During the CFA, the same items were extracted having regression weights 0.78 for B1.8, 0.72 for E1.11 and 0.71 for E1.6, indicating that the port's own environmental performance management would effectively contribute to the environmental dimension of regional development.

The environmental dimension becomes significant in the social and spatial matrix of the ports' host regions. The external port stakeholders showed more interest in improving the environmental standards of ports and their reporting systems, while the internal port stakeholders emphasised ports' energy consumption efficiency. This has been reflected during CFA in Table 7.32.

Table 7.32: Environmental dimension related items extracted during CFA

Item	**Regression weight (Squared multiple correlations)**	
	Internal port stakeholders	External port stakeholders
B1.8: Publishing annual environmental report indicating trends in port's environmental management performance	.74 (.55)	.79 (.63)
E1.11: Manage port's own energy consumption nature for improving energy efficiency	.81 (.66)	.70 (.49)
E1.6: Improve the environmental standards beyond those required under legislation	.57 (.32)	.73 (.54)

7.8.1.4 ARPs strategies along the spatial dimension

In terms of a port's contribution to regional development, the spatial dimension relates to geographical characteristics, opportunities and the systematic capitalisation of the port and its region. The relevant items extracted during CFA were C1.5 (Having policy support to be involved in collaborative activities with regional organisations), C1.4 (Sharing port resources for collaboration with regional organisations) and C1.3 (Developing a flexible structural, functional and planning environment consistent to regional demand) with the regression weights 0.89, 0.88 and 0.78 respectively.

During the EFA, these three items received factor loadings 0.839, 0.839 and 0.838 respectively, indicating a need for policy support, planning, and sharing of resources for collaboration with regional organisations. Another two items, D1.1 (Being proactive within the regional networks to exploit the business potential of the region) and B1.11 (Innovation in the port sector activities) with factor loadings 0.629 and 0.613 respectively, highlighted the pro-active leadership of ports within regional networks for innovation and business.

The telephone interview outcomes suggested that business opportunities involving regional resource configuration (CT14) and leadership for regional innovation system (CT10, CT11) were the areas where ARPs need to be proactive.

For ports' contribution to the spatial dimension of regional development, both the internal and external stakeholders agreed that ports need policy support for collaborative involvement and sharing of resources with regional organisations to achieve a regional competitive advantage. The external port stakeholders emphasised developing a flexible operational environment for ports to be involved in serving regional demands (Table 7.33).

Table 7.33 Spatial dimension related items extracted during CFA

Item	Regression weight (Squared multiple correlations)	
	Internal port stakeholders	External port stakeholders
C1.5 Having policy support to be involved in collaborative activities with regional organisations	.87 (.76)	.88 (.77)
C1.4 Sharing port resources for collaboration with regional organisations	.84 (.71)	.88 (.78)
C1.3 Developing a flexible structural, functional and planning environment consistent to regional demands	.65 (.43)	.78 (.62)

7.8.2 ARPs strategies and regional development approaches

This section examines the strategic approach of ARPs for effective regional development. From a policy perspective, as discussed in section 2.5 of chapter 2, there are three approaches to developing strategies for regional development: a resource based approach, a knowledge based approach and a place based approach. These approaches have their own important features, but they have interrelating issues to regional development. This section will link the findings from both research strands to the features of each approach and recommend the best approach that ARPs can adopt.

7.8.2.1 Resource based strategic approach

The ARPs are spatially important features in their host regions. They are pivotal to regional development as they serve the regional resources sector, primary producers, exporters and importers. Better utilisation of both port and regional resources is critical for regional development. In a resource based approach, utilisation of resources in an integrated way is critical for producing a competitive advantage. Table 7.34 presents the basic features of the resource based approach and the qualitative and quantitative findings related to this approach.

Table 7.34: Features and findings related to the resource based approach

Features	Findings related to resource based approach
1) Asset, capability, competency or skill and knowledge are considered as resources 2) Resources should be simultaneously valuable, rare, non-substitutable, and inimitable 3) Ability to integrate, generate and reconfigure internal and external resources, in other words dynamic capability in a changing circumstance is important 4) Resources should produce competitive advantage not duplicable and not being implemented currently by competitors	Qualitative findings: **TIP38-** Regional ports produce a big part of the value of Australia's total trade **C5** RD catalyst **C11** Interfacing platform for regional competitive advantages **C12** Network point for the regional business **C13** Critical conduit for the organisational cooperation **C15** Gateway for export-import **C16** Economic strategist **Quantitative findings** **D1.7:** Providing incentives and support to regional businesses in their early stage (Mean 3.11) **C1.8** Coordinating port-centric logistics networks (FL 0.502)

ARPs are important assets in their regions as reflected by the codes of interview data, including C5 (RD catalyst), C11 (Interfacing platform for regional competitive advantages), C12 (Network point for the regional business), C13 (Critical conduit for the organisational cooperation), C15 (Gateway for export-import) and C16 (Economic strategist). They are fundamental conduits for major industries in the region that generate employment and wealth, and that export or import cargo and goods for the people in the region. However, a lack of competency and skill exists in ARPs which has been commented on by a telephone interview participant.

> *Lack of leadership, lack of understanding of a port's importance within the region, poor management, lack of accountability, lack of financial reporting to the community are the major constraints of regional ports in Australia.*
>
> *- TIP# 08.*

The ARPs handle a significant amount of Australia's total trade (TIP# 38) which is a source of competitive advantage for the region. Each Australian regional port has its own captive hinterland and the port infrastructure is specific to that hinterland. Although there are some similarities between port locations, the geographical settings and the services they provide are unique. The substitutability or further development of port infrastructure is costly and access to funding for port development is limited. This restricts the resource creation competency of ports. There is also a lack of leadership and expertise to deliver port expansion projects.

The ARPs produce valuable, rare, unique, and non-substitutable resources for the region. However, due to poor financial performance (C39) and inadequate funding for port development (C37), the ARPs ability to integrate, generate and reconfigure internal and external resources is limited. The comments of two telephone interview participants are notable:

> *The Port has difficulty in securing funds for further development of port infrastructure to facilitate shipping activities.*
>
> -*TIP* # 02
>
> *As a port we don't have enough funding for ourselves, but would like to call for another business. If you look at the infrastructure at ports around Australia, many of the ports have infrastructure which is maybe 30 to 50 years old and that constraint the cash reserve available at the government or commercial funding towards infrastructure.*
>
> -TIP # 05

This has further been reflected by the survey results, with a comparatively low mean of 3.11 for item D1.7 (Providing incentives and support to regional businesses in their early stage). The low factor loading (0.502) of item C1.8 (Coordinating port-centric logistics networks) indicates that the

coordinating activities of ARPs within logistics networks have not been given emphasis.

7.8.2.2 Knowledge based strategic approach

As the knowledge based approach is an extension of the resource based approach, the shortfalls of the resource based approach also impact on the knowledge based strategic approach to regional development. The dynamics of knowledge is the driving force of knowledge based approach where the creation of knowledge, expansion of tacit knowledge (that is, non-codified knowledge), capability of learning space (that is, institutional spheres for collaboration), and innovation illustrate the dynamism of knowledge. Table 7.35 presents the basic characteristics and findings of both strands related to the knowledge based approach.

In the qualitative strand, the potential for an ARP to be knowledge base has been revealed by code C18 (Knowledge hub for regional economy). ARPs can build a knowledge base through community involvement, and one telephone interviewee's comment is notable in this regard:

> *Ensuring the port's message to the community is an effort to developing the knowledge base.*
>
> *-TIP# 02*

An ARP's potential to be a platform for regional innovation system (RIS) has also been reflected in the composite code CT11 (Participatory platform for RIS).

In the quantitative strand, during the EFA and CFA, item D1.5 (Opening port as a knowledge centre for interactive learning for regional organisations) had a high factor loading (0.793) and regression weight (0.81). This illustrates the potential of the ARPs to be interactive learning spaces, where organisational learning and collaboration for innovation

(C46) are possible. But a lower mean of 2.88 for this item indicates the underlying reality that the ARPs' community involvement, consultation with the community, and stakeholder management processes are not adequate at present. This restricts the ARPs from being effective learning centres for innovation. Moreover, the ARPs have dynamic environmental challenges and ports require a great deal of knowledge, innovation and capability to overcome these challenges.

Table 7.35: Features and findings related to knowledge based approach

Features	Findings relating knowledge based approach
1) Resources are same as resource based approach with special emphasis on 'knowledge' as the dynamic element rather a generic resource 2) Knowledge, innovation and consensus spaces (institution spheres agreeing for collaboration) provide impetus to integrate endogenous and exogenous strategies 3) Interactive learning space where face-to-face interaction is possible for spreading tacit knowledge (that is, non-codified knowledge) 4) The sustainable competitive advantage is achieved through knowledge creation, continuous improvement and organisational learning	**Qualitative findings** **C18.** Knowledge hub for regional economy **C46** Systemic engagement for regional innovation **CT11** Participatory platform for RIS **Quantitative findings** **D1.5:** Opening port as a knowledge centre for interactive learning for regional organisations (FL 0.793, RW 0.81, mean 2.88)

7.8.2.3 Place based strategic approach

Collaboration, configuration of regional resources and opportunities, and regional preferences are important strategic initiatives in the place based approach (Cantin 2010). In this approach, a port's sustainable competitive advantage depends on the effective exploitation of its distinctive and localised capabilities. This can be achieved by promoting knowledge sharing, innovation and entrepreneurship in the socio-economic-environmental matrix of the port region (Cantin 2010; Wolfe 2011).

Table 7.36 presents the basic characteristics of this approach and the findings of both strands related to the place based approach.

Table 7.36: Features and findings related to place based approach

Features	Findings relating place based approach
1) Regional resources, opportunities, linkages, human capital and capacities (endogenous potential) are recognised as central in this approach 2) Sustainable competitive advantage depends on distinctive, localised capabilities and is achieved by promoting knowledge sharing, innovation, collaboration, entrepreneurship, and regional preference 3) Strong and adaptable local institutes, and interactive learning spaces are required 4) Involvement of diverse range of stakeholders for identification, decision-making and configuration of regional resources is critical	Qualitative findings **C9** Community engagement for innovation **C24** Entrepreneurship in joint stakeholder initiatives **C25** Regional collaboration for supply chain integration **C28** Procurement from the region **C40** A participatory leadership in the region for RIS **C44** Participation in innovative regional resource configuration **C47** Regional platform for RIS **C48** Common interest for innovation **C49** Holistic perspective for RIS **C50** Customer interaction for innovation Quantitative findings **D1.2** Demonstrating entrepreneurship for regional innovation to enhance regional competitive advantage **B1.5** Enhancement of social networks with regional stakeholders **D1.1** Being proactive within the regional networks to exploit the business potential of the region **B1.10** Allowing increased private sector participation in ports **B1.11** Innovation in the port sector activities **C1.1** Exchanging information as a pivotal point in supply chain networks **D1.5** Opening port as a knowledge centre for interactive learning for regional organisations

The endogenous potential of ports and their regions (regional resources, opportunities, linkages, human capital and capacities) are recognised by the ARPs, and this has been reflected as follows in the telephone interviews with key port stakeholders:

- Port has a very good sense of regional strengths and constraints when it comes to their involvement in the regional development (TIP# 01)

- Port performs economic studies for the region and impact study of port to the region. (TIP# 04)
- Port formulates demand modelling for the supply chain (TIP# 38)
- Ports share information through the port community and networks. In this way, ports can gain an understanding of local preferences (TIP# 34)
- Ports procure labour and most of the fabrication works within the region (TIP#05)
- Because of a technology shortage in the region, some procurement cannot be done locally.' (TIP# 04)
- 'Ports also have a buy local program through which they try to source from local businesses, whether it is goods or services and they spend millions of dollars in the community and regions.' (TIP# 05)

The code C28 (Procurement from the region), reflects the regional preference of the ARPs. Ports establish linkages between places within the country; they maintain relationships with sister-ports in other countries, and they establish commercial trade links both nationally and internationally (TIP# 01, TIP# 05, TIP# 38).

The codes of the qualitative strand C9 (Community engagement for innovation), C24 (Entrepreneurship in joint stakeholder initiatives), C25 (Regional collaboration for supply chain integration), C40 (A participatory leadership in the region for RIS), C44 (Participation in innovative regional resource configuration), C47 (Regional platform for RIS), C48 (Common interest for innovation), C49 (Holistic perspective for RIS), C50 (Customer interaction for innovation) show the necessity for ARPs to participate in RIS and to collaborate for regional resource configuration.

The retained items of the EFA such as D1.2 (Demonstrating entrepreneurship for regional innovation to enhance regional competitive

advantage), B1.5 (Enhancement of social networks with regional stakeholders), D1.1 (Being proactive within the regional networks to exploit the business potential of the region), B1.10 (Allowing increased private sector participation in ports) and B1.11 (Innovation in the port sector activities) show the importance of ports' involvement with a diverse range of stakeholders, as well as entrepreneurship, innovation and private sector participation. The retained items during the CFA, C1.1 (Exchanging information as a pivotal point in supply chain networks) and D1.5 (Opening port as a knowledge centre for interactive learning for regional organisations) reveal the ARPs' potential as adaptable, interactive learning centres in the region. These findings are all consistent with the characteristics of the place based approach as shown in Table 7.36.

7.8.2.4 Recommended strategic approach for ARPs: Place based approach

The place based approach is recommended for Australian regional ports to be effectively involved in regional development. This approach is closely related to the utilisation of regional resources, capacities of regional organisations, and the presence of learning spaces in the region. The above discussion suggests that the place based approach is appropriate for ARPs to be involved in regional development. Justification for this is provided in the following:

1) Data integration illustrates that most of the qualitative and quantitative strand findings match the characteristics of a place based approach.

2) Adequate funding or access to port development funds is crucial for ARPs. In this context, the ARPs need to capitalise on policy benefits, rather than looking too much for funds. The place based approach brings in more policy benefits for regional development, rather than being wholly dependent on investment for regional

development (Olfert et al. 2011). This capacity for the place based approach to provide policy benefits is an important reason to employ this strategic approach for ARPs' effective involvement in regional development.

3) The place based approach has an inclusive nature to address the issues of a specific place. Each ARP has different characteristics in terms of spatial or geographical setting and the service it provides for its region. A place based strategic approach may be a better option, as the focus of this approach is on resources and capabilities of the host region. As far as regional resources and capabilities are concerned, the place based approach also covers some elements of the resource based approach and knowledge based approach. The economic, social and environmental dimensions of the region are prominent in the place based approach. This matches with the regional development dimensions, the ports sustainability dimensions and triple bottom line approach of the ports' corporate social responsibility.

4) The CFA outcome provides a four-factor model with relevant items (Table 7.23). Factor 1 (Being interactive and entrepreneurial for RIS- Cronbach's alpha 0.875) clearly suggests that the ARPs need to be interactive learning platforms in their regions. Factor 4 (Being pro-active for port's environmental challenges and social responsibility- Cronbach's alpha 0.818) emphasises the enhanced involvement of ARPs in the environmental and social dimensions of the region. These are important characteristics of a place based approach.

5) The place based approach is a collaborative means for addressing the specific issues in a socio-economic-environmental matrix of a port-region. In the final CFA outcome, factors 2 and 3 depict the

necessity of collaboration for ARPs with regional organisations and supply chain members for effective contribution to regional development. Factor 2 (Collaboration for supply chain efficiency-Cronbach's alpha, 0.765) suggests integral performance of ARPs' core services and regional demands through ensuring supply chain efficiency. Factor 3 (Collaboration with regional organisations-Cronbach's alpha, 0.899) emphasises regional opportunities and innovation through collaboration. By doing so, the ARPs are able to facilitate the smooth access of goods and services to the regions, increase the living standard of the region and enhancing prospects for further investment and economic growth in the region. These are the expected outcomes of adopting the place based approach for regional development.

7.9 Summary

This chapter presented the quantitative data analysis and integrated the qualitative and quantitative outcomes. The objectives of this chapter were to answer the two quantitative research questions and the explicit mixed methods research question. Two quantitative research questions were intended to explore and generalise the pertinent factors and possible strategic initiatives for Australian regional ports' (ARPs) better involvement in regional development and the explicit mixed methods research question pursued the effective approach for ARPs contribution in regional development.

The literature review and the outcome of the qualitative strand's telephone interview with the key ARPs' stakeholders informed the quantitative strand. The conceptual model of the qualitative strand was investigated through a web-based questionnaire survey in the quantitative strand. The data of this quantitative strand were analysed through the exploratory factor analysis (EFA), followed by the confirmatory factor analysis (CFA) in order to generate a measurement model.

Though the qualitative strand of this research produced a conceptual model for ARPs' involvement in regional development, it neither generalised the notion of ARPs' engagement in regional development nor evaluated the strategic activities of ports in terms of various regional development dimensions. It is the quantitative strand of this research that communalised the notion of regional development in a regional port context and generalised the qualitative outcomes. The quantitative results extrapolated the conceptual model into a measurement model and substantiated the strategic intents of ARPs to be involved in various regional development dimensions.

From the ARPs' standpoint, the quantitative strand contributed to specifying the importance of various regional development dimensions where regional ports can be involved. The implications of the quantitative strand outcomes include an expectation of developing a new port management matrix where ports' involvement in economic, social, environmental, and spatial dimensions of regional development would have their own weighting. Therefore, the port industry can systemise to appropriate indicators for measuring ports' involvement in regional development.

At the end of confirmatory factor analysis in the quantitative strand, the results showed that being interactive and entrepreneurial in the regional innovation system (RIS), collaborating for supply chain efficiency, collaborating with other regional organisations, being pro-active for the port's environmental challenges and social responsibility are all vital strategies for enhancing ARPs' contribution to regional development. These strategies are interrelated as ARPs need to be entrepreneurial to exploit regional opportunities where collaboration, supply chain efficiency, interactive activities with the community and other regional businesses and organisations, belongingness and proactiveness for environment and

social wellbeing of the port-region are critical. Broad collaboration surrounding regional ports will create a facilitating and supportive space in port-region for the co-development of both ports and regions.

Data integration of qualitative and quantitative strands suggests that the ARPs may involve in each dimension of regional development in varying extent subject to the geographical settings and capability of the ports. From ARPs perspective, the dimensions of regional development are economic, social, environmental and spatial. These dimensions are also interrelated as an ARP is embedded within a regional economy where the spatial characteristics and regional resource configuration are critical elements for regional development. The economy exists within the society, and society exists within the sphere of environment. Economic dimension is vital for ARPs business viability and sustainability. The involvement in environmental dimension may achieve through protection of the environment through upgrading, minimising or internalising environmental externalities. Social dimension can be achieved by focusing on building social capital through ensuring community well-being which is again intrinsically related to economic and environmental contributions of ARPs and participation of ARPs resource configuration and regional innovation system.

Overall, the place based approach was proposed for ARPs to be effectively involved in regional development as the data integration of qualitative and quantitative strands further illustrates that most of the findings match with the characteristics of a place based approach. The characteristics of a place based approach includes configuration scope of regional resources, opportunities, linkages, human capital and capacities (endogenous potential); distinctive, localised capabilities in promoting knowledge sharing, innovation, collaboration, entrepreneurship, and regional preference; strong and adaptable local institutes, and interactive learning spaces; and involvement of regional organisations and

stakeholders for identification, decision-making and configuration of regional resources. The data integration suggests that the contributions of ARPs to economic, social, environmental and spatial dimensions of regional development can be effective by being interactive, entrepreneurial, and collaborative in the regional space which mostly corresponds to the place based approach of regional development. In the context of inadequate access to port development funds and different geographical settings of ARPs, the place based approach has been proposed for ARPs effective involvement in regional development because of its inclusive nature to address place oriented issues and the capacity of providing more policy benefits.

In the next concluding chapter, the findings, contributions and limitations of this research will be summarised, and further research directions will be recommended.

CHAPTER 8: CONCLUSION

8.1 Introduction

This thesis is an empirical study investigating the strategic roles of Australian regional ports (ARPs) in regional development. The study necessitated an extensive analysis of the key literature in the field of regional development, as well as a review of studies on the role of ports in their regions, on regional development in Australia and on Australian regional ports (in chapters 2, 3 and 4 respectively).

This study adopted an exploratory sequential mixed methods research methodology, consisting of a qualitative strand followed by a quantitative strand, to answer the following four research questions and the explicit mixed methods research question.

RQ 1: How are Australian regional ports currently involved in their host regions?
RQ 2: What is the scope for Australian regional ports to be involved in regional development?
RQ 3: What are the factors pertinent to Australian regional ports' involvement in regional development?
RQ 4: What strategic initiatives can be undertaken by Australian regional ports to be better involved in regional development?

The explicit mixed methods research question:
How can Australian regional ports effectively contribute to regional development?

The qualitative strand explored the involvement of ARPs in their host regions and the scope to be involved in regional development, through

semi-structured telephone interviews with key ARP stakeholders. Based on the qualitative findings, answering RQ1 and RQ2, a conceptual model was proposed and a survey instrument (questionnaire) was prepared. The model was then further investigated through a web-based survey in the quantitative strand, to explore the pertinent factors and relevant strategic initiatives for ARPs to be better involved in regional development, aimed at answering RQ3 and RQ4. In answering the explicit mixed methods research question, the data integration of both strands suggested a place-based approach for ARPs' effective contribution to regional development.

This concluding chapter summarises the research findings from a review of the literature and the empirical study, and discusses the implications and contributions of this study. The limitations of the research are discussed and further research directions are recommended.

8.2 Summary of the findings

In terms of regional ports, various illustrations were found in the literature, but with no unified definition. In the context of different port classification, the regional ports have fallen into two broad classifications in the literature, such as the supra-national and the sub-national perspectives. Although not widespread as a research area, this research study has focused on the sub-national perspective and has adopted Australian regional ports (ARPs) as the unit of analysis. The definition of Australian regional ports was somewhat complicated due to differing views on what constitutes a regional port and thus its region. This research synthesised the views, framed a definition for regional ports, and validated the definition in the Australian context. The findings proposed a definition of an Australian regional port as a port outside metropolitan cities which facilitates regional trade, serves regional producers, businesses and the mining sector, provides a defence logistics base, and contributes to a reduction in congestion for metropolitan ports.

In addition to the above, the findings of this research are summarised in two groups: the findings from the literature review and the findings from the empirical study. The empirical study findings are presented in three sub-groups: qualitative findings from telephone interviews, quantitative findings from the web-based survey and findings from the integration of qualitative and quantitative results.

8.2.1 Findings from the literature review

The purpose of the literature review was to evaluate the characteristics and potential of the ports' contribution to regional development. The objectives of the literature review were to explore the regional development dimensions and approaches (Chapter 2), to investigate the relationship between a port and its region (Chapter 3), and to explore Australian regional ports' potential to be a driver for regional development (Chapter 4).

The findings on regional development suggest that a sense of collective purpose among regional businesses, infrastructure and organisations, is required for regional development. Infrastructure is a facilitating tool which, although not the sole contributing factor to regional development, creates an environment for it to occur. In the Australian context, policy support to enhance a collective sense of purpose in the region is an essential, effective, and ongoing task for regional Australia.

Although the dimensions to regional development are quite broad, multifarious, overlapping and interweaving in nature, from a national perspective, they can be more simply categorised as social, economic, environmental, and spatial dimensions.

As ports link industries, products and markets, ultimately they promote regional specifications and products for the purpose of gaining competitive advantage, which in turn contributes to the development of their regions.

From an organisational standpoint, a policy perspective approach is important for effective involvement in regional development and three aspects have been identified to facilitate this. These are a resource based approach, a knowledge based approach and a place based approach.

The literature review indicates that the role of ports has changed considerably over time, from being a place of refuge for ships and a centre of transport activities, to becoming a crucial node in the supply chain that serves as a logistics hub. It also identifies essential strategic issues that the port management has to administer, such as hinterland development, promotion of innovation, community involvement, and enhancement of environmental and socio-economic contributions of ports to the regions.

A port and the region in which it is embedded have a symbiotic relationship, where their growth is conditional upon one another. Given this relationship, the interaction and involvement of ports and their stakeholders is pivotal to the development of the port and the region.

The relationship between a port and its region has been studied by scholars from different perspectives. One group argues that a port is as an engine of growth in local and regional development (Bichou 2009; Bryan et al. 2006; Haralambides 1997; Jung 2011). Others consider a port as merely satisfying demand by providing support for freight transportation (Damesick 1986; Fujita & Mori 1996; Goss 1990c; Grobar 2008; McCalla 1999; Rodrigue 2003). Notteboom et al. (2009) consider port development and regional growth as two separate progressions that are only indirectly and intermittently related. The common denominator of these varying views is that a port is very much engaged with its region.

The roles of ports in their host regions have also been examined in various aspects throughout the evaluation process and the findings suggest that they can be placed into five broad categories. These are such as a

facilitator between trade and transport, an economic catalyst, a link in the supply chain, a gateway to the port network, and a geo-dimensional role in regional development.

Australian regional ports (ARPs) performed about 85% of freight task for the national sea freight and therefore play a significant role in regional development. Corporatised and privatised port governance models exist for ARPs, which may affect regional ports' role to be involved in regional development. Limited access to funding for port development is a problem for ARPs where private sector participation in ports may ease this situation. The National Ports Strategy and National Land Freight Strategy implemented recently further enhance ARPs roles in helping achieve competitive advantage for Australian regional products. Due to the different geographical attributes of each port-region and a symbiotic relationship between ARPs and their host regions, the strategy of APRs to contribute to regional development may vary from port to port. A little is known from the literature about the characteristics of current involvement of ARPs with the regional communities, organisations, and businesses to strengthen the relationship between ports and regions. Hence, it is critical to know the perceptions of key ARPs stakeholders on the possibility of ARPs' involvement in multi-stakeholders initiatives, supply chain efficiency, stakeholder management, information generation and sharing about the region. It is also important to know the leadership and proactiveness of ARPs in engaging in regions, and in participating in regional resource configuration.

8.2.2 Findings from the empirical study

This section summarises the empirical results generated from telephone interviews undertaken in the first phase of this study (qualitative strand), and the web-based survey in the second phase (quantitative strand). Additionally, the integrated findings obtained from combining the results of qualitative and quantitative strands are presented. This section organizes

the main findings in each phase of study corresponding to the four research questions and the explicit mixed methods research question.

8.2.2.1 Qualitative findings from telephone interviews

In the first phase of this research, 38 semi-structured telephone interviews were conducted to explore the perceptions of key ARP stakeholders on ports' strategic role in regional development. A snowball sampling strategy was adopted to collect data and a thematic analysis using NVivo 10 software, supplemented with traditional manual approach, was performed to develop codes and main themes during the data analysis of this strand. The final outcomes of the first phase qualitative strand include a conceptual model for ARPs to be involved in regional development and a web survey instrument (questionnaire), developed to express the breadth and depth of the conceptual model. The instrument has been used to collect data in the quantitative strand (second phase).

RQ 1: How are Australian regional ports currently involved in their host regions?

The telephone interview participants answered questions covering the relationships of the port with its host region. It included community relationships with regional businesses and entities, the port's contribution to the region and development, the current issues of ports, the port's proactiveness in engaging with local businesses, and its involvement in the regional innovation system.

The findings of the qualitative strand indicated that ARPs are critical conduits for their regions, but that their level of involvement in the region varies from port to port, due to their geographical setting and industry structures. ARPs export regional primary products and resources, import cargo for local demand, and allow resource sectors to operate smoothly. They support communities and regions by providing direct and indirect

employment opportunities and they enhance the competitive advantage of regional products, which contributes to regional development. Other activities ARPs undertake include the regular dissemination of port and trade information to local businesses; community involvement through community liaison committees; sponsorship for community activities, environment, sporting and regional businesses; and managing amenity impacts, so as to integrate the port with the city.

In regard to ARPs' involvement in economic, social, environmental and spatial aspects of regional development, the findings showed that regional ports' activities are focused on economic considerations, while the social dimension is partially addressed through ports' sponsorship programmes and corporate social responsibility. The environmental dimension is served through implementing environmental management. The spatial dimension is addressed through representation of ports in regional resource utilisation committees, chambers of commerce and by implementing specific port expansion projects to meet regional demand.

ARPs are region-centric organisations and should be proactive and holistic in developing their strategy in accordance with the regional economy and resource configuration, rather than simply be reactive and limited to transport demand. The telephone interview participants indicated that ARPs could be more directly involved in regional development, rather than only contributing from a lobbying level, if they have appropriate policies and good financial support. ARPs also need to ensure the fundamentals of ports' planning capability, long term plans, and efficiency of ports as a crucial supply chain element.

The empirical results of the qualitative study show that ARPs currently face some challenges which include a lack of quality port connectivity with rail, a lack of investment in port development, an absence of financial delegation to ports, and inadequate community accountability. An absence

of stakeholder management, lack of leadership initiatives and innovation; and a lack of long term plans and demand modelling of ports are also significant issues. It is also found that a decline in manufacturing in regional Australia, insufficient inland transport infrastructure, limited population and internal demand are the major issues.

The growth of the resource sector in regional Australia presents a great opportunity for ARPs. The potential of ARPs as a platform for regional innovation is important for ports' involvement in regional development. ARPs as pivotal regional organisations can create the participatory learning environment for their regions. The ports' involvement in collaboration with regional organisations or multi-stakeholder initiatives, in helping regional businesses in their initial stages, and in playing a leading role in the information flow in the region are crucial elements for regional innovation.

The growth of a region and a port located in that region are complementary to each other, and this in turn accelerates regional development. The integration of a supply chain that runs through ports, more private sector participation in ports, and the development of an information sharing network are important elements for the ARPs involvement in regional development.

RQ 2: What is the scope for Australian regional ports to be involved in regional development?

The thematic analysis of the telephone interview data generated three major themes representing the scope for ARPs to be involved in regional development. These are port sustainability, building collaborative advantages, and active participation of ARPs in the regional innovation system (RIS). With these three themes, a conceptual model for ARPs'

involvement in regional development has been framed for further validation in the quantitative study.

Port sustainability is a fundamental principle which allows a port to operate responsibly in its host region. In the literature, port sustainability has been categorised into the three dimensions of economic, social and environmental sustainability (Bailey 2009; Chen et al. 2012; Hinds 2008). ARPs are symbiotically connected to the regional economy, where the economy exists within society, and society exists within the sphere of environment. Therefore ARPs contribute to all three dimensions in various degrees. The development of long term plans, in-house planning capability, the business viability of a port, a nurturing environment, the enhancement of social capital and an optimal public-private partnership are critical for a port's sustainability. Long term planning is required for systematic productivity outcomes, increased investment confidence and greater environmental protection (Ports Australia 2013a). Likewise, an optimal or balanced public-private partnership is required for enhanced innovation and entrepreneurship, which is central to port sustainability in the resource oriented geographical settings of the ARPs.

Key ARP stakeholders suggested that 'building on collaborative advantages' and 'active participation of ports in the regional innovation system' are two approaches through which ARPs can be involved in regional development. Exchange of information is the backbone of collaboration, and collaboration by ARPs with other regional organisations can facilitate the exchange of information, the sharing of resources and can improve the capability of those organisations within the region to achieve a mutually beneficial outcome (Himmelman 2002). Collaboration is also important for port sustainability, regional innovation, regional competitiveness and supply chain efficiency, all of which impact on regional development.

Innovation enhances regional competitiveness, which in turn strengthens regional development. This regional competitiveness is achievable through appropriate regional resource configuration, which is dependent on the presence of a functioning platform for a regional innovation system (RIS). ARPs offer supportive infrastructure for production in regional Australia and are critical to the RIS. The findings showed that the key ARP stakeholders recognise that ports have the necessary local knowledge, infrastructure, organisation, business relationships and commercial objectives to support businesses in the region, and acknowledge their potential for being an active platform for the RIS. Proactive and participatory leadership by ARPs can help to promote regional innovation by evaluating regional strengths and weaknesses.

8.2.2.2 Quantitative findings from the web-based survey

The web-based questionnaire investigated the pertinent factors and strategies for ARPs' better involvement in regional development by answering the following research questions in the quantitative strand.

RQ 3: What are the factors pertinent to Australian regional ports' involvement in regional development?

RQ 4: What strategic initiatives can be undertaken by Australian regional ports to be better involved in regional development?

Using the Exploratory Factor Analysis (EFA) and then the Confirmatory Factor Analysis (CFA), 101 responses were collected and analysed. The CFA outcome indicated four factors and strategies pertinent to the ARPs' better involvement in regional development. The factors were:

- Being an interactive and entrepreneurial port in the regional innovation system (RIS)
- Collaboration for supply chain efficiency
- Collaboration with regional organisations

- Being pro-active for ports' environmental challenges and social responsibility.

1) First factor and strategic initiatives:

The strategic initiatives corresponding to the first factor (Being an interactive and entrepreneurial port in the RIS) are as follows-

- Opening port as a knowledge centre for interactive learning for regional organisations
- Providing incentives and support to regional businesses in their early stages
- Making efforts for capacity enhancement of other regional organisations

The 'entrepreneurial port' concept (Van Winden & Van Klink 1998) is seldom discussed in the literature, whereas knowledge-based port economy and learning harbour has been emphasised (Allaert 2007). The findings of this research emphasised the ports' capability for promoting interactive learning and for providing incentives and capacity enhancement support to other regional organisations. Innovative business incubation has been suggested for ARPs, which is a relatively new idea for regional ports and interactive learning and entrepreneurship is emphasised to promote regional innovation.

2) Second factor and strategic initiatives:

The strategic initiatives corresponding to the second factor (Collaboration for supply chain efficiency) are as follows-

- Developing a flexible, functional and planning environment consistent with regional demands
- Making joint efforts with other supply chain members to increase supply chain efficiency
- Exchanging information as a pivotal point in supply chain networks

3) Third factor and strategic initiatives:

The strategic initiatives corresponding to the third factor (Collaboration with regional organisations) are as follows-

- Making continuous efforts to increase the number of collaborative activities with regional organisations
- Sharing port resources for collaboration with regional organisations
- Having policy support to be involved in collaborative activities with regional organisations

The quantitative findings of this study illustrate the importance of collaboration for ports' involvement in regional development and identify two types of collaboration for ports. The first is to collaborate with relevant members of supply chains that run through the port. The objective of this collaboration is to achieve efficiency in supply chain performance (that is, the second factor). The second type of collaboration is with other regional organisations (that is, the third factor). The objective is to enhance regional resource configuration and to increase regional competitive advantage. This type of collaboration is new for many ports around the world as they are usually concerned with core port business rather than non-core, non-maritime business. The internal port stakeholders (port officials) are in cautious agreement on this factor, as it might have influence on the financial viability of the port. Increasingly, there is a need for regional ports to be involved in collaboration with regional organisations for regional development.

The involvement of ports in regional development in turn offers ports an advantage by creating a ground for sustainable business. This enhances port and regional co-development opportunities, an emerging concept that has very recently appeared in executive discussion (Pallis 2013a). In this context, it is important to achieve a balance between the two types of collaboration.

4) Fourth factor and strategic initiatives:

The strategic initiatives corresponding to the fourth factor (Being pro-active for port's environmental challenges and social responsibility) are as follows-

- Management of a port's energy consumption for improving energy efficiency
- Publishing annual environmental reports indicating trends in a port's environmental management performance
- Improving the environmental standards beyond those required under legislation
- Enhancing corporate social responsibility

A port's environmental and social contributions are a growing concern from an organisational standpoint (Bailey 2009; ESPO 2012b; Haezendonck & Dooms 2007; Haezendonck, Dooms & Verbeke 2010; Li, Lu & Xiang 2008). This has been recognised as an important factor for ARPs' involvement in regional development. The findings show that ports should improve their energy consumption efficiency. From an auditing and accountability perspective, the findings highlighted the value of annual reporting on ports' environmental management. The corporate social responsibility of ports has gained momentum in recent strategic discussions (Dooms & Verbeke 2007; Fransen 2013). This has been reflected as a strategy in the findings.

8.2.2.3 Results of integration of qualitative and quantitative findings

The integration of qualitative and quantitative findings directed the ultimate inference on the approach of ARPs to effectively contribute to regional development and answer the explicit mixed methods research question (Ex-MMQ): *How can Australian regional ports effectively contribute to regional development?*

1) **Place based approach for ARPs involvement in regional development**

Although Haezendonck (2001) suggests a resource based approach to initiating port strategy, the ability of the ARPs to integrate, generate and reconfigure internal and external resources may be limited due to poor financial performance, inadequate port development or a lack of leadership. The shortfalls of a resource based approach also restrict the adoption of a knowledge based approach for ARPs to be involved in regional development, because a knowledge based approach is an extension of a resource based approach. Allaert (2007) discusses the concept of a 'learning centre' as part of a knowledge based approach in port strategy. Lee (2010) addresses dynamic environmental challenges around a port from a knowledge resource perspective in the maritime transport industry. Some elements of a knowledge based approach are prominent in each strand of this research. In the qualitative strand, the key port stakeholders suggest that ARPs could become knowledge hubs for regional economy or platforms for the regional innovation system. In the quantitative strand, the strategy of opening ports as knowledge centres for interactive learning for regional organisations has been suggested in the CFA outcomes.

By integrating the empirical data from both research strands along the four dimensions of regional development (social, economic, environmental and spatial) and linking with the features of three basic approaches of regional development (resource based, knowledge based and place based), this study recommends a place based approach for ARPs' effective involvement in regional development. The place based approach is an overarching approach where regional resource and knowledge are given specific emphasis from endogenous development perspective. Although the place based approach has not been found in port strategy literature, the data indicates that the basic characteristics of a place based approach

match with the findings of this research (see Table 7.36 of chapter 7). This outcome is relatively new in regional port management research. Though Australian regional resources have immense potential, the poor financial situation of many ARPs, insufficient funding for port development, inadequate stakeholder management and poor community relations suggest that a place based approach would be the best option for ARPs. Due to the inclusive and collaborative nature of a place based approach, ports could address the issues relating to concerned port-region and thereby generate more benefits for it.

The place based approach to port strategy for regional development is an endogenous strategic approach where port-region gets the priority. The literature review findings illustrate that a resource based approach has been recommended for ports such as Hamburg and Le Havre (Haezendonck 2001), while a knowledge based approach has been suggested for ports such as Ostend (Allaert 2007). The relatively strong financial capability of these ports may have provided more flexibility to think beyond their host regions.

2) The ARPs' role in regional development

An ARP's role in regional development is very much dependent on the spatial features and setting of the region in which it is embedded. A port authority plays a critical role in establishing a port's role in its region. Literature has suggested different roles of ports in their regions such as a facilitator between trade and transport, an economic catalyst, an element in the supply chain, a gateway in the network system. From a port authority's functional perspective, a geo-dimensional role has also been anticipated (Verhoeven 2010).

Participants in the telephone interviews highlighted several roles which ARPs are playing in their host regions. These included economic strategists, network leaders, regional enablers, facilitators between trade

and transport, objective stakeholders, and community managers. Further investigation into the roles of ARPs undertaken through the web-based questionnaire revealed that the top three roles that ARPs play are: gateways in a network system, trade and transport facilitators and hubs for regional economy (regional enablers). It is interesting to note that ARPs were not seen as active community managers.

In terms of the CFA outcomes of the four specific factors and corresponding strategies, ARPs can play a role as regional enablers for regional development. The first factor indicated that ARPs need to be interactive and entrepreneurial in the RIS. Regional innovation promotes interactive and entrepreneurial activities, which lead to regional competitive advantages (Cooke, Gomez Uranga & Etxebarria 1997; Moulaert & Mehmood 2010). These interactive and entrepreneurial activities would provide ARPs with the opportunity to enable regional competitive advantage.

The second and third factors emphasised collaboration for supply chain efficiency and collaboration with the other regional organisations for both port and region co-development. Collaboration strengthens regional competitive advantage (Council on Competitiveness 2010; Ketikidis, Zigiaris & Zaharis 2010) and promotes synergy in regional development. Collaboration may have two-way benefits. On the one hand, it can ensure the economic stability of ports and on the other hand it can enhance regional growth. Therefore, the participation of ARPs in collaboration with supply chain members and other regional organisations supports the regional enabler role of ports.

The fourth factor highlighted the improvement of environmental and social performance of ports through pro-active and innovative involvement. The response to the demands for environmental innovation is central to the success of future port gateway innovation (Hall, O'Brien & Woudsma

2010) which is key to achieving regional competitive advantage. Therefore, this fourth factor also suggests a regional enabler role for ARPs.

Overall, a place based strategic approach, with ARPs as regional enablers, can facilitate their effective involvement in regional development. The more the regional ports engage in active regional resource configuration efforts, in addressing environmental challenges and social responsibilities in a collaborative, innovative, and entrepreneurial way with other regional organisations, the richer the ports' contributions become for regional development. In return, regional ports can benefit through the creation of a ground for sustainable business practices.

8.3 Implications of the study

The findings of this research have several implications for port management, policy makers, and port users. This study proposes a place based approach with four factors and relevant strategic initiatives for ARPs. In addition to engaging in corporate social responsibility, port management should focus on a place based individual port matrix consisting of economic, social, environmental and spatial dimensions, to be better involved in regional development. Collaboration and innovation, business viability, and long term planning aligned with the concerned regional setting should be factors in such a matrix. The necessary indicators should be established to monitor and report the performance in each dimension of regional development. This will eventually result in a new type of port planning and port management, based on collaboration, cooperation and regional business involvement (Pallis 2013b) where regional development and symbiotic relationships of ports with their host regions will remain at the core. ARPs will adopt the role of regional enabler, rather than simply a gateway for regional export-import business.

Port policy makers need to provide necessary policy support in terms of flexibility for ports' participation in a regional innovation system (RIS), ports' collaborative involvement in regional businesses, enhancing optimal public-private partnerships in the port sector, and easy access to funding for port development. This will lead to a port governance system where collaboration and delegation, rather than traditional command and control, will be the practice. Delegation, monitoring and accountability will be at the core of this innovative port management system and the necessary policy support will form a firm base for the system.

Adopting a place based approach for ARPs' strategic involvement in regional development will develop a more synergistic and closer relationship with port users and other regional organisations in terms of collaboration for supply chain efficiency, business opportunity capture, and participation in regional resource configuration. This will enhance the sense of belonging among port users and other regional organisations for serving the regions and for port activities, and will increase social capital (that is, networking, shared values and trust in the region) of the region where port will be the pivotal point. As the social capital increases, it will encourage responsible ways of doing business in the region where environmental challenges and social responsibilities will get adequate attention.

8.4 Contributions of the study

This study makes several contributions. Firstly, it defines Australian regional ports from the empirical study. The description of regional ports in a national context is ambiguous in the literature. This research defines Australian regional ports and offers a better understanding of regional ports in a national context.

Secondly, this study contributes to the literature of port management and development studies, especially to the regional port management

literature. As the regional port management is an emerging concept in maritime research, this research assists not only in understanding the pertinent factors for regional ports to be involved in regional development, but also in accelerating the understanding of how regional ports can be better involved in their host regions.

Thirdly, this study contributes to the port management literature by recommending a place based strategic model for regional ports. The identification of a port's geo-dimensional role and its contribution to regional development can enhance the role of infrastructure in regional development and traditional methodological concepts for regional development. This research offers suggestions for strengthening the relationship between ports and their regions, and has the potential to encourage different port stakeholders to play their respective supportive roles. This research proposes a place based strategic approach for Australian regional ports' effective involvement in regional development, where ports' entrepreneurship, innovation and collaboration are the critical elements in configuring regional resources. This strategic approach may be of interest to regional ports in other parts of the world.

Fourthly, this is a cross-dimensional research which combines two broad subjects: port management and regional development. Despite various limitations, regional development agencies integrate, support and coordinate regional development activities in the concerned regions. In this context, the place based strategic approach of organisations such as regional ports will create an environment for regional development which will be complimentary to the functions of regional development agencies. Therefore, it can be seen that this research draws a more comprehensive picture of regional development from regional infrastructural and organisational standpoint, thereby contributing to the literature.

Finally, this thesis contributes to the methodological development of port management research in three ways: i) by using mixed methods research methodology in maritime research, ii) by integrating qualitative and quantitative results, and iii) by developing an innovative methodology for port management research. These have been illustrated below:

1) An exploratory sequential design of a mixed methods research approach has been adopted in this study to explore the strategic role of ARPs in regional development. In social science, mixed methods research as a methodology has increasing been used since the 1980s (Chen 2012). Subjects such as sociology, education, and health science have widely applied mixed methods research as methodology (Creswell & Plano Clark 2011). In business management research, there is a growing desire to combine quantitative and qualitative approaches (Buchanan & Bryman 2007; Molina-Azorin 2011). In the field of maritime research, there is no clear indication or investigation of the mixed methods approach (Woo et al. 2013). This study makes a contribution through setting an example in this regard.

2) Although the application of mixed methods research in social science is popular, the lack of sufficient integration of quantitative and qualitative data and findings in many research adopting multiple methods is also apparent (Bryman 2007; Woolley 2009). This is because of the absence of clear examples on integration (Woolley 2009). Many authors provide metaphors to illustrate integration of qualitative and quantitative approaches in a mixed methods research (Bazeley 2009; Bazeley & Kemp 2011; Erzberger & Kelle 2003; Plano Clark, Garrett & Leslie-Pelecky 2010), but the lack of standard examples of qualitative and quantitative data integration limits the appropriate utilisation of mixed methods research. This thesis contributes by illustrating the ways of integrating the qualitative and quantitative data and findings in order to achieve a more

comprehensive outcome from an exploratory sequential mixed methods design.

3) This study also contributes to the methodological development of port management research in terms of inventing the strength of qualitative approach to create a base for the quantitative approach. Bazeley (2008) argues that quantification of qualitative data is the most common method in the qualitative data analysis process in management research. Creswell and Plano Clark (2011), Teddlie and Tashakkori (2003) and Symonds and Gorard (2010) suggest more innovation in designing a mixed methods research. The innovation in designing a mixed methods research should focus on exploiting the strength of both approaches to address the research question more profoundly.

The data in each strand of this mixed methods research were collected separately and an inductive thematic data analysis was performed with the use of NVivo 10 software and traditional manual techniques during the qualitative data analysis. The mixture of software and manual techniques was adopted to reduce the risk of losing any context during the data analysis process (Sandelowski 2003). Data analysis included techniques such as the selection of nodes, creation of codes and themes, identification of quotes that reflect the tone of the responses, transforming data in terms of the quantification of the qualitative data, and identification of extreme outliers (Creswell & Plano Clark 2011). As well as manual techniques such as code frequency and code occurrence matrix across nodes, specific NVivo techniques such as text query, word frequency, and matrix coding were used to conduct the thematic analysis. The central objective of the data analysis was to explore the reality, underlying reasons, and rationale for better engagement of Australian regional ports to regional development. In this sense, this mixed methods research offers an example of

innovation in port management research and maximising the strength of qualitative approach to create the base for quantitative strand.

8.5 Limitations of this research

Every research strategy has its flaws. This study has several limitations related to research strategies and research quality. Firstly, despite the benefits of adopting exploratory sequential design of mixed methods strategy in this research, it demanded more work, resources and considerable time to implement the design (Creswell & Plano Clark 2011; Molina-Azorin 2011). The qualitative strand of this mixed methods research encompassed the geographical setting of Australia, so semi-structured telephone interviews were conducted. Semi-structured telephone interviews could be a limitation in this research as face-to-face interviews might have generated more comprehensive and complex data (Sue & Ritter 2007). Additionally, the qualitative research may have a potential bias imposed by the researcher during the interview and data analysis process. To mitigate this bias, the researcher maintained a distance from the telephone interviews, so as not to convey any experience, beliefs, or judgments to the interviewees. Interviews were recorded, notes were taken, and these were revised during transcription, preparation, data analysis, and final inferences.

Secondly, a web-based survey in the quantitative strand was used as data collection method. This may have had limitations in respect of coverage, reliance on software, and uncertainty about who was responding to the survey (Sue & Ritter 2007). However, Gosling et al. (2004) illustrated these preconceptions as unwarranted, and stated that the web-based survey can produce trustworthy and quality data. Given the time frame and limited resources for this research, the web-based survey was adopted for its flexibility and easy accessibility to widely distributed regional port stakeholders in Australia.

Thirdly, the sampling techniques used in both strands of this mixed methods research may have limitations. As the ARPs were scattered around the entire coastline of this continent nation, the identification of and accessibility to port stakeholders was a challenge in both strands. For the semi-structured telephone interviews, a purposeful snowball sampling strategy was adopted to reach the information-rich key port stakeholders. This sampling technique was partially dependent on the judgement of the initial interview participants to provide referrals for further telephone interviews. The initial list of participants was prepared by consultation with experts and officials. To reduce the risk of missing interviews with any information-rich participants, the telephone interviews were continued until saturation occurred in getting data on the topic and in receiving similar referrals for further telephone interviews from those participants (Guest, Bunce & Johnson 2006).

Fourthly, a list-based stratified sampling strategy was adopted in the quantitative strand to collect data through a web-based survey. The control over sampling was important as insufficient internet coverage, lack of speedy internet coverage, false identities and multiple responses from the same individuals would reduce the quality of data collection. List-based stratified sampling established this control. The main purpose of stratification was not to compare the outcomes of data analysis, but to generate a more representative sample. This control of sampling was important because it was difficult to locate the relevant samples as the research involved two areas - port management and regional development. Port stakeholders included respondents from regional development agencies and various port users and this necessitated careful scrutiny to select an appropriate sample. The list-based stratified sampling also assisted in generating a more representative sample with respect to strata (Bethlehem & Biffignandi 2012).

Finally, this research focused on the Australian regional ports which may have posed some generalizability issues. However, Australian regional ports are comparable to many regional ports in other countries. Moreover, a survey instrument was developed for the quantitative strand, not only based on the telephone interview data analysis, but also in conjunction with relevant international port management literature. These steps helped capture the length and breadth of the issues and enhanced generalizability of this research. Overall, the use of mixed methods strategy enhanced the validity and reliability of the research as the weakness of one strand was minimised by the other.

8.6 Recommendations for future research

Several directions are suggested for further research. Firstly, in the qualitative strand of this thesis, the conceptual model was generated by analysing the telephone interview data of ARP key stakeholders. This conceptual model has been further explored and generalised through a web-based survey in the quantitative strand to reach to a measurement model. Although the measurement model recommends the probable strategic initiatives for ARPs' effective involvement in regional development, the investigation of causal relations among various strategic initiatives may provide more firm ground for the ARPs' managers and policy makers to adopt and implement consistent strategies for regional development. Therefore, future research to investigate these causal relations could be conducted through hypotheses testing to achieve a structural model.

Secondly, the conceptual model of the qualitative strand indicated that port sustainability is the fundamental element in regional development. Integration of qualitative and quantitative outcomes suggests that ARPs can be involved in economic, social, environmental and spatial dimensions of regional development through adopting a placed based approach. However, without a systematic evaluation, a place based approach may

lead to different contexts (Bellefontaine 2011; Bradford & Chouinard 2009). As defining indices is crucial to achieving the objective of sustainable port development (Allaert 2007), further research should be undertaken to identify a set of operational and strategic performance indicators for measuring a port's contribution to regional development. In formulating these indicators, a port's objective for sustainable development and a place oriented approach to attaining regional competitive advantage should be emphasised. Future research could investigate the basic characteristics of indicators for ARPs, so that 'the inclusion of regional impacts can be analysed for ports in order to have a better insight in the total socio-economic impacts of ports' (Haezendonck, Dooms & Verbeke 2010, p.11). In both strands of this research, building on the collaborative advantages emerged as an important factor for ARPs' involvement in regional development. Further study could serve to develop indicators in the co-operational/collaborative matrix for ARPs in terms of a place based approach. In this context, a future research could also consider ports' regional development efforts from a port cluster point of view.

Thirdly, a general approach with a sequential exploratory mixed methods research design has been adopted in this research to cover all Australian regional ports. Four pertinent factors have been identified in the final measurement model. There is now an opportunity for future research through in-depth case studies with specific Australian regional ports to investigate the applicability of a place based strategic approach. Given the time frame and resources, capturing mediating factors in the confirmatory factor analysis was out of scope in this research. The adoption of another research methodology may improve the measurement model. It would also be interesting to explore whether any mediating factor is essential for ARPs involvement in regional development.

Finally, the role of ports in their host regions and regional development was reviewed from a general standpoint and then the conceptualisation was tested in the context of Australian regional ports. Future research could be conducted in other countries' regional ports, so that a comparison could be made with regional ports in other parts of world in terms of their involvement in regional development. This would create momentum and would enhance the strategic dimension of research in port management, where a port's role as a regional enabler is crucial for sustainable co-development of both the port and its region.

REFERENCES

ABC 2012, *Australia's Political System*, Australian Broadcasting Corporation, http://www.abc.net.au/ra/federasi/tema1/aus_pol_chart_e.pdf, accessed 31 March 2014.

ABS 2013, *Australian Bureau of Statistics*, http://www.abs.gov.au/ausstats/abs@.nsf/Products/8153.0~December+2012~Chapter~Sector?OpenDocument, accessed 10 June 2013.

ABS 2014a, *Australian Demographic Statistics, Sep 2013*, Australian Bureau of Statistics, http://www.abs.gov.au/ausstats/abs@.nsf/mf/3101.0, accessed 31 March 2014.

ABS 2014b, *Industry*, Australian Bureau of Statistics, http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/1301.0~2012~Main%20Features~Industry~8, accessed 31 March 2014.

ABS 2014c, *Industry structure and performance*, Australian Bureau of Statistics, http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/1301.0~2012~Main%20Features~Employment%20in%20Australian%20Industry~241, accessed 31 March 2014.

ACFID 2010, 'Human Rights-Based Approaches to Development', in *Practice Note Series*, Australian Council for International Development (ACFID), Canberra, Australia.

ACIL Tasman 2009, 'Vision 2020 Project: The Australian Minerals Industry's Infrastructure Path to Prosperity', in *An assessment of industrial and community infrastructure in major resources regions*, Minerals Council of Australia, Canberra.

Adaman, F. & Devine, P. 2002, 'A Reconsideration of the Theory of Entrepreneurship: a participatory approach', *Review of Political Economy,* vol. 14, no. 3, pp. 329-355.

Adams, K. & Buultjens, J. 2010, *Analysis of Regional Development Models & Their Contribution to Sustainable Regions*, Sustainable Economic Growth for Regional Australia (SEGRA), http://www.segra.com.au/segra10CD/presentations/tuesday/concurrents/JeremyBuultjenspwt.pdf, accessed 14 Oct 2013.

Aerts, G., Dooms, M. & Haezendonck, E. 2013, 'Stakeholder management in ports: Managerial perspectives on the current state of

stakeholder management in landlord port authorities', *Proceedings of the International Association of Maritime Economists (IAME) 2013*. Marseille, pp.

African Development Bank 2013, 'An integrated approach to infrastructure provision in Africa', in *African Infrastructure Knowledge Program*, African Development Bank, Nigeria.

Ahern, N. R. 2005, 'Using the internet to conduct research', *Nurse Researcher,* vol. 13, no. 2, pp. 55-70.

Ahmad, N. & Seymour, R. G. 2008, 'Defining Entrepreneurial Activity: Definitions Supporting Frameworks for Data Collection', in *OECD Statistics Working Paper*, Paris.

Albrecht, A. C. & Jones, D. G. 2009, 'Web-Based Research Tools and Techniques', in *Compelling counseling interventions: VISTAS 2009,* eds. G. R. Walz, J. C. Bleuer & R. K. Yep*,* American Counseling Association, Alexandria, pp. 337-347.

Alderton, P. M. 2008, *Port Management and Operations*, LLP, London.

Allaert, G. 2006, 'Learning Harbours: Knowledge, innovation and economic growth-Reflections to Ostend Port (Belgium)', in *Ports are more than piers,* Uitgeverij De Lloyds, Antwerp.

Allaert, G. 2007, 'Learning Harbours: Knowledge, innovation and economic growth-Reflections to Ostend Port (Belgium)', *Expert meeting of Gaza Seaport Project*, http://www.planning.ugent.be/downloads/agenda/congres/expertmeeting%207%20maart%202007.pdf, accessed 22 September 2011.

Alman, D. 2011, *Organisational Sustainability*, Proventive Solutions, http://proventivesolutions.com.au/media/Organisational%20Sustainability%20V5.pdf, accessed 01 Feb 2013.

Almotairi, B. 2012, *Integrated Logistics Platform: The context of the port relational exchanges and systematic integration,* PhD thesis, Chalmers University of Technology, Goteborg, Sweden.

Almotairi, B. & Lumsden, K. 2009, 'Port logistics platform integration in supply chain management', *International Journal of Shipping and Transport Logistics,* vol. 1, no. 2, pp. 194-210.

Amin, A. 1998, An Institutionalist Perspective on Regional Economic Development, unpublished Paper presented at the Economic Geography Research Group Seminar on 'Institutions and Governance', July 3 1998,Department of Geography UCL, London, http://www.egrg.org.uk/pdfs/amin.pdf, accessed 25 Nov 2010.

Anderson, D. 2011, 'Industry Perspective on the National Ports Strategy', *Proceedings of the Regional Ports Conference 2010 (presentation slides)*, Darwin Port Corporation, Darwin, Australia.

Angell, B. & Townsend, L. 2011, 'Designing and conducting mixed methods studies', in *Presentation slides on the Workshop for the 2011 Society for Social Work and Research annual meeting*, Rutgers School of Social Work, The State University of New Jersey.

Arbuckle, J. L. 2012, *IBM SPSS Amos 21 User's Guide*, IBM Corp, ftp://public.dhe.ibm.com/software/analytics/spss/documentation/amos/21.0/en/Manuals/IBM_SPSS_Amos_Users_Guide.pdf, accessed 12 September 2013.

Ascani, A., Crescenzi, R. & Iammarino, S. 2012, 'Regional Economic Development: A Review', in *WP1/03 Search Working Paper*, Department of Geography and Environment, London School of Economics and Political Science.

Asciano 2010, *Asciano submission on the proposed National Ports Strategy*, http://www.infrastructureaustralia.gov.au/public_submissions/nps/files/10_008Asciano.pdf, accessed 31 January 2012.

Asheim, B. 2007, 'Differentiated knowledge bases and varities of regional innovation systems', *Innovation: The European Journal of Social Science Research,* vol. 20, no. 3, pp. 223 - 241.

Asheim, B. T. & Coenen, L. 2005, 'Knowledge bases and regional innovation systems: Comparing Nordic clusters', *Research Policy,* vol. 34, pp. 1173-1190.

Australia, L. s. L. 2013, 'Newcastle to be privatised', *Lloyd's List DCN*, http://www.lloydslistdcn.com.au/archive/2013/june/18/newcastle-to-be-privatised, accessed 18 June 2013.

Australian Government 2007a, 'The Australian Code for the Responsible Conduct of Research', in *Revision of the joint NHMRC/AVCC statement and guidelines on research practice*, National Health and Medical Research Council, Canberra.

Australian Government 2007b, 'The National Statement on Ethical Conduct in Human Research 2007', in *National Statement*, National Health and Medical Research Council, Canberra.

Australian Government 2012, *Shipping Reform*, The Department of Infrastructure and Transport, http://www.infrastructure.gov.au/maritime/shipping_reform/, accessed 03 July 2013.

Australian Government 2014a, *About Australia*, Department of Finance, http://australia.gov.au/about-australia/our-country, accessed 30 March 2014.

Australian Government 2014b, *Australia's trade in goods and services 2012-13*, Department of Foreign Affairs and Trade, http://dfat.gov.au/publications/tgs/index.html, accessed 31 March 2014.

Australian Shipowners Association 2008, 'Inquiry into interaction of regional road and rail networks and their connectivity to ports', in *Submission to the House of Representatives Standing Committee on Transport and Regional Services*, Australian Shipowners Association.

Australian Shipowners Association 2012, 'Senate Committee on Economics Legislation', in *Submission by Australian Shipowners Association*, Australian Shipowners Association, Canberra.

Axelsson, R. & Axelsson, S. B. 2006, 'Integration and collaboration in public health - a conceptual framework', *International Journal of Health Planning and Management,* vol. 21, pp. 75-88.

Baer, L. 2009, 'Port Infrastructure Development-Opportunities in these Challenging Times', *AAPA Commissioners Seminar,*

Bailey, K. 2009, 'Sustainable Port Communities'*, Proceedings of the 1st Hemispheric Convention on Port Environmental Protection, July 22-25, 2009*, Fox de Iguacu, Brazil.

Baird, A. J. 2000, 'Port Privatisation: Objectives, Extent, Process, and the UK Experience', *International Journal of Maritime Economics,* vol. 2, no. 3, pp. 177-194.

Baltazar, R. & Brooks, M. R. 2007, 'Port governance, devolution and the matching framework: A configuration theory approach', in *Devolution, Port Governance and Port Performance,* ed. M. Dresner*,* Elsevier, Oxford, UK.

Barney, J. 1991, 'Firm Resources and Sustained Competitive Advantage', *LJournal of Management,* vol. 17, no. 1, pp. 99-120.

Barrett, P. 2007, 'Structural equation modelling: Adjudging model fit', *Personality and Individual Differences,* vol. 42, no. 5, pp. 815-824.

Bazeley, P. 2003, 'Computerized data analysis for mixed methods research', in *Handbook of Mixed Methods in Social & Behavioral Research,* eds. A. Tashakkori & C. Teddlie*,* SAGE Publications, Thousand Oaks, CA, pp. 385-422.

Bazeley, P. 2007, *Qualitative Data Analysis with NVivo*, SAGE Publications, London.

Bazeley, P. 2009, 'Editorial: Integrating Data Analyses in Mixed Methods Research', *Journal of Mixed Methods Research,* vol. 3, no. 3, pp. 203-207.

Bazeley, P. & Kemp, L. 2011, 'Mosaics, Triangles, and DNA: Metaphors for Integrated Analysis in Mixed Methods Research', *Journal of Mixed Methods Research,*

Beer, A. & Kearins, B. 2004, 'Regional Dimensions in National Development: Understanding the Role of Regionally Focussed Economic Development in Achieving National Growth', in *Paper presented to the Inaugural National Regional Research Colloquium*, School of Geography, Population and Environmental Management, Flinders University.

Beer, A. & Maude, A. 2005, 'Governance and the Performance of Regional Development Agencies in Australia', in *Participation and Governance in Regional Development: Global Trends in an Australian Context,* eds. R. Eversole & J. Martin, Ashgate, Hampshire.

Beer, A., Maude, A. & Pritchard, B. 2003, *Developing Australia's regions: theory and practice*, University of New South Wales, Sydney, Australia.

Begg, I. 2002, "Investability': The Key to Competitive Regions and Cities?', *Regional Studies,* vol. 36, no. 2, pp. 187-193.

Bell, E. & Bryman, A. 2007, 'The Ethics of Management Research: An Exploratory Content Analysis', *British Journal of Management,* vol. 18, no. 1, pp. 63-77.

Bellamy, J. & Brown, A. J. 2009, 'Regional governance in rural Australia: An emergent phenomenon of the quest for liveability and sustainability?', http://journals.isss.org/index.php/proceedings53rd/article/view/1289/450, accessed 12 July 2013.

Bellefontaine, T. 2011, 'The Evaluation of Place-Based Approaches: A research agenda', in *Policy Research Institute- ISEMA Special Edition* Carlton University, Ontario.

Benefits-of-Recycling 2013, *Types of Sustainability*, http://www.benefits-of-recycling.com/typesofsustainability/, accessed 30 Jan 2013.

Benneworth, P., Conroy, L. & Roberts, P. 2002, 'Strategic Connectivity, Sustainable Development and the New English Regional

Governance', *Journal of Environmental Planning and Management,* vol. 45, no. 2, pp. 199 - 217.

Bentler, P. M. 1990, 'Comparative fit indexes in structural models', *Psychological Bulletin,* vol. 107, no. 2, pp. 238-246.

Bergman, M. M. 2011, 'The Good, the Bad, and the Ugly in Mixed Methods Research and Design', *Journal of Mixed Methods Research,* vol. 5, no. 4, pp. 271-275.

Bethlehem, J. & Biffignandi, S. 2012, *Handbook of Web Surveys*, Wiley, New Jersey.

Bichou, K. 2009, *Port Operations, Planning and Logistics*, Informa, London, UK.

Bichou, K. & Gray, R. 2004, 'A logistics and supply chain management approach to port performance measurement', *Maritime Policy and Management,* vol. 31, no. 1, pp. 47-67.

Bird, J. (ed.) 1971, *Seaports and Seaport Terminals,* Hutchinson, London.

BITRE 2008a, *Australian sea freight, 2006-2007*, Bureau of Infrastructure, Transport and Regional Economics (BITRE), Canberra ACT.

BITRE 2008b, 'A regional economy: a case study of Tasmania', in *Report 116*, Bureau of Infrastructure, Transport and Regional Economics, Canberra.

BITRE 2009a, 'Australian sea freight, 2007-2008', in *Information paper 64*, Bureau of Infrastructure, Transport and Regional Economics (BITRE), Canberra ACT.

BITRE 2009b, *Australian transport statistics*, Bureau of Infrastructure, Transport and Regional Economics (BITRE), Canberra ACT.

BITRE 2009c, *Australian transport statistics yearbook 2009*, Bureau of Infrastructure, Transport and Regional Economics (BITRE), Canberra ACT.

BITRE 2009d, *Road and rail freight: competitors or complements?*, Bureau of Infrastructure, Transport and Regional Economics (BITRE), Canberra ACT.

BITRE 2010a, *Australian sea freight, 2008-09*, Bureau of Infrastructure, Transport and Regional Economics (BITRE), Canberra ACT.

BITRE 2010b, *Road freight estimates and forecasts in Australia: interstate, capital cities and rest of state*, Bureau of Infrastructure, Transport and Regional Economics (BITRE), Canberra ACT.

BITRE 2011a, *Australian infrastructure statistics Yearbook 2011*, Bureau of Infrastructure, Transport and Regional Economics (BITRE), Canberra ACT.

BITRE 2011b, *Australian sea freight 2009-10*, Bureau of Infrastructure, Transport and Regional Economics (BITRE), Canberra ACT.

BITRE 2012, 'Trainline 1', in *Bureau of Infrastructure, Transport and Regional Economics (BITRE)- Statistical Report June 2012*, Commonwealth of Australia, Canberra ACT, p. 76.

BITRE 2013, 'Australian sea freight 2011-12', in *Statistical report: Maritime*, Bureau of Infrastructure, Transport and Regional Economics (BITRE), Canberra ACT.

Blöchliger, H. & Vammalle, C. 2012, 'Reforming fiscal relations: Going beyond the zero-sum game', in *Reforming Fiscal Federalism and Local Government: Beyond the Zero-Sum Game,* OECD Publishing.

Bollen, K. A. 1990, 'Overall fit in covariance structure models: Two types of sample size effects', *Psychological Bulletin,* vol. 107, no. 2, pp. 256-259.

Boschma, R. A. 2005, 'Proximity and Innovation: A Critical Assessment', *Regional Studies,* vol. 39, no. 1, pp. 61-74.

Bosma, S. 2012, *Legislation alert: Reform in the Australian shipping industry*, Blake Dawson, http://www.nortonrosefulbright.com/au/knowledge/publications/61828/australian-shipping-industry-reform--coastal-trading-bill?utm_source=Mondaq&utm_medium=syndication&utm_campaign=inter-article-link, accessed 02 April 2014.

Bossink, B. A. G. 2007, 'Leadership for sustainable innovation', *International Journal of Technology Management & Sustainable Development,* vol. 6, no. 2, pp. 135-149.

Bradford, N. & Chouinard, J. A. 2009, 'Learning Through Evaluation? Reflections on Two Federal Community-Building Initiatives', *The Canadian Journal of Program Evaluation,* vol. 24, no. 1, pp. 51-77.

Branch, A. E. 1986, *Elements of Port Operation and Management*, Chapman and Hall Ltd, New York, USA.

Braun, P. 2005, 'Looking for a C-Change: Factors Contributing to Regional Development', in *Participation and Governance in Regional Development: Global Trends in an Australian Context,* eds. R. Eversole & J. Martin, Ashgate, Hampshire.

Breckler, S. J. 1990, 'Applications of covariance structure modeling in psychology: Cause for concern?', *Psychological Bulletin,* vol. 107, no. 2, pp. 260-273.

Brette, O. & Moriset, B. 2009, 'Bringing Down Territorial Inequalities in the Digital Economy: An Evolutionary Institutional Approach', *Journal of Economic Issues,* vol. 43, no. 2, pp. 495-502.

Brooks, B. 2012, Research themes from NCPS, unpublished Discussion of Research Priorities in the National Centre for Ports and Shipping (NCPS) Research Committee Meeting.

Brooks, M. R. 2004, 'The Governance Structure of Ports', *Review of Network Economics,* vol. 3, no. 2, pp. 168-183.

Brooks, M. R. 2007, 'Port devolution and governance in Canada', in *Devolution, Port Governance and Port Performance,* ed. M. Dresner*,* Elsevier, Oxford, UK.

Brooks, M. R. 2010, 'Maritime Reform and the Coasting Trade: An Australian Policy Challenge', *Visiting Scholar Presentation, Institute of Transport and Logistics Studies, University of Sydney,*

Brooks, M. R. & Cullinane, K. (eds) 2007, *Devolution, Port Governance and Port Performance,* Elsevier, Oxford, UK.

Brooks, M. R., Mccalla, R., Pallis, A. A. & Lugt, V. D. 2009, 'Coordination and Cooperation in Strategic Port Management: the Case of Atlantic Canada's Ports*'*, *Proceedings of the International Association of Maritime Economics*. Copenhagen, pp.

Brooks, M. R. & Pallis, A. A. 2008, 'Assessing port governance models: process and performance components', *Maritime Policy & Management,* vol. 35, no. 4, pp. 411-432.

Brooks, M. R. & Pallis, A. A. (eds) 2011, *Port Governance,* Wiley-Blackwell, Oxford.

Bryan, J., Munday, M., Pickernell, D. & Roberts, A. 2006, 'Assessing the economic significance of port activity: evidence from ABP Operations in industrial South Wales', *Maritime Policy & Management: The flagship journal of international shipping and port research,* vol. 33, no. 4, pp. 371 - 386.

Bryman, A. 2007, 'Barriers to integrating quantitative and qualitative research', *Journal of Mixed Methods Research,* vol. 1, no. 1, pp. 8-22.

Bryman, A. 2008, *Social research methods*, 3rd edn, Oxford University Press, New York.

Bryman, A. & Cramer, D. 2004, 'Constructing variables', in *Handbook of data analysis,* eds. M. Hardy & A. Bryman, Sage, London, pp. 17-34.

BTE 2000, *Regional impact of ports*, Bureau of Transport Economics (BTE), Canberra ACT.

BTE 2001a, *Regional Impact of the Port of Gladstone*, Bureau of Transport Economics (BTE), Canberra ACT.

BTE 2001b, *Regional Impact of the Port of Mackay*, Bureau of Transport Economics (BTE), Canberra ACT.

BTRE 2003a, *Australian sea freight, 2000-2001*, Bureau of Transport and Regional Economics (BTRE), Canberra ACT.

BTRE 2003b, *Australian sea freight, 2001-2002*, Bureau of Transport and Regional Economics (BTRE), Canberra ACT.

BTRE 2005, *Australian sea freight, 2002-2003*, Bureau of Transport and Regional Economics (BTRE), Canberra ACT.

BTRE 2006a, *Australian sea freight, 2003-2004*, Bureau of Transport and Regional Economics (BTRE), Canberra ACT.

BTRE 2006b, *Freight Measurement and Modelling in Australia*, Bureau of Transport and Regional Economics (BTRE), Canberra ACT.

BTRE 2007a, *Australian sea freight, 2004-2005*, Bureau of Transport and Regional Economics (BTRE), Canberra ACT.

BTRE 2007b, *Australian sea freight, 2005-2006*, Bureau of Transport and Regional Economics (BTRE), Canberra ACT.

Buchanan, D. A. & Bryman, A. 2007, 'Contextualizing Methods Choice in Organizational Research', *Organizational Research Methods,* vol. 10, no. 3, pp. 483-487,489-501.

Budd, L. & Hirmis, A. 2004, 'Conceptual Framework for Regional Competitiveness', *Regional Studies,* vol. 38, no. 9, pp. 1015-1028.

Burney, S. M. A. 2008, *Inductive & deductive research approach*, University of Karachi, http://www.drburney.net/INDUCTIVE%20&%20DEDUCTIVE%20RESEARCH%20APPROACH%2006032008.pdf, accessed 27 August 2012.

Byrne, B. M. 2001, *Structural equation modelling with AMOS: Basic concepts, applications and programming*, Lawrence Erlbaum Associates, Inc., New Jersey, USA.

Cahoon, S., Pateman, H. & Chen, S.-L. 2013, 'Regional port authorities: leading players in innovation networks?', *Journal of Transport Geography,* vol. 27, no. 0, pp. 66-75.

Cahoon, S. C. 2004, *Seaport Marketing: A Census of Australian Seaports,* PhD thesis, University of Tasmania, Launceston, Australia.

Camagni, R. & Capello, R. 2010, 'Macroeconomic and territorial policies for regional competitiveness: an EU perspective', *Regional Science Policy & Practice,* vol. 2, no. 1, pp. 1-19.

Cantin, B. 2010, 'Integrated Place-Based Approaches for Sustainable Development', *Horizons: Sustainable Places,* vol. 10, no. 4

Carbone, V. & De Martino, M. 2003, 'The changing role of ports in supply-chain management: an empirical analysis', *Maritime Policy & Management,* vol. 30, no. 4, pp. 305-320.

Carifio, J. & Perla, R. J. 2007, 'Ten common misunderstandings, misconceptions, persistent myths and urban legends about Likert scales and Likert response formats and their antidotes ', *Journal of Social Sciences,* vol. 3, no. 3, pp. 106-116.

Carifio, J. & Perla, R. J. 2008, 'Commentaries: Resolving the 50-year debate around using and misusing Likert scales', in *Medical Education*, Blackwell Publishing Ltd, Massachusetts.

Carr, E. C. J. & Worth, A. 2001, 'The use of the telephone interview for research', *Nursing Times Research*, no. 6

Cedefop 2007, *Learning together for local innovation: promoting learning regions*, European Centre for the Development of Vocational Training (Cedefop), http://www.cedefop.europa.eu/EN/Files/3047_en.pdf, accessed 14 March 2011.

Chalmers, K. & Weiler, S. 2011, 'Sorting winners and losers: using CGE models to assess income distribution effects of economic development choices', *Regional Science Policy & Practice,* vol. 3, no. 1, pp. 1-15.

Chang, Y.-T. 2013, 'Environmental efficiency of ports: a Data Envelopment Analysis approach', *Maritime Policy & Management,* vol. 40, no. 5, pp. 467-478.

Chen, L. 2012, *A mixed methods study investigating intangibles in the banking sector,* thesis, University of Glasgow, Glasgow, UK.

Chen, P., Haugstetter, H., Cahoon, S. & McCall, T. 2010, 'Constructing competitive advantage: Regional ports in local innovation systems-

The case of Burnie port', in *Final Report*, Australian Maritime College, Launceston, pp. 1-55.

Chen, S.-L., Cahoon, S. & Haugstetter, H. 2010, 'A Regional Port's Role in Its Local Innovation System: The Regional Development Platform Method', in *2010 Annual Conference of the International Association of Maritime Economists*, Lisbon, Portugal.

Chen, S.-L., Effler, J. R. & Roche, A. L. d. L. 2001, 'Using Internet services to generate a research sampling frame', *Nursing & Health Sciences,* vol. 3, no. 1, pp. 15-18.

Chen, S.-L. & Everett, S. 2013, 'The dynamics of port reform: different contexts, similar strategies', *Maritime Policy & Management, in press, available online 21 October 2013*, pp. 1-14, http://dx.doi.org/10.1080/03088839.2013.839513, accessed 9 Dec 2013.

Chen, S.-L., Nguyen, H.-O., Cahoon, S. & Sakalayen, Q. 2012, 'Regional port development: The case study of Tasmanian ports, Australia', in *International Association of Maritime Economists 2012 Conference*, Taipei, Taiwan.

Chen, S. L. 2009, 'Port Administrative Structure Change Worldwide: Its Implication for Restructuring Port Authorities in Taiwan', *Transport Reviews,* vol. 29, no. 2, pp. 163-181.

Clark, X., Dollar, D. & Micco, A. 2004, 'Port efficiency, maritime transport costs, and bilateral trade', *Journal of Development Economics,* vol. 75, no. 2, pp. 417-450.

Coeck, C. 2002, 'Book review: Essays on strategy analysis for seaports by Elvira Haezendonck', *International Journal of Maritime Economics,* vol. 4, pp. 185-187.

Coeck, C. 2006, 'An Evaluation of the Strategic Planning Processes in Port Areas: Recommendations based upon Spatial, Economic, Organisational, Ecological and Political Considerations', in *Ports are more than piers,* ed. T. Notteboom, Uitgeverij De Lloyd, Antwerp, Belgium.

Colletis-Wahl, K. & Pecqueur, B. 2001, 'Territories, Development and Specific Resources: What Analytical Framework?', *Regional Studies,* vol. 35, no. 5, pp. 449 - 459.

Collins, K. M. T., Onwuegbuzie, A. J. & Jiao, Q. G. 2007, 'A Mixed Methods Investigation of Mixed Methods Sampling Designs in Social and Health Science Research', *Journal of Mixed Methods Research,* vol. 1, no. 3, pp. 267-294.

Collins, K. M. T., Onwuegbuzie, A. J. & Sutton, I. L. 2006, 'A model incorporating the rationale and purpose for conducting mixed-methods research in special education and beyond', *Learning Disabilities: A Contemporary Journal,* vol. 4, no. 1, pp. 67-100.

Collits, P. 2002, 'Australian Regional Policy and Its Critics', *Proceedings of the The 11th Biennial Conference of the Australian Population Association*. Sydney, pp.

Collits, P. 2004, 'Policies for the future of regional Australia', *European Planning Studies,* vol. 12, no. 1, pp. 85 - 97.

Comrey, A. L. & Lee, H. B. 1992, *A First Course in Factor Analysis*, 2nd edn, Lawrence Erlbaum Associates, New Jersey.

Comtois, C. & Slack, B. 2007, 'Competitiveness of green gateways: A blueprint for Canada', in *Ports in Proximity,* eds. T. Notteboom, C. Ducruet & P. D. Langen, Ashgate, Surrey, England, pp. 151-62.

Cook, P. & Memedovic, O. 2003, 'Strategies for Regional Innovation Systems: Learning Transfer and Applications', in *Policy Papers*, United Nations Industrial Development Organization (UNIDO), Vienna.

Cooke, P., Clifton, N. & Oleaga, M. 2005, 'Social capital, firm embeddedness and regional development', *Regional Studies,* vol. 39, no. 8, pp. 1065-1077.

Cooke, P., Gomez Uranga, M. & Etxebarria, G. 1997, 'Regional innovation systems: Institutional and organisational dimensions', *Research Policy,* vol. 26, no. 4-5, pp. 475-491.

Cooke, P. & Morgan, K. 1998, *The Associational Economy: Firms, Regions, and Innovation*, OUP, New York.

Cooke, P., Uranga, M. G. & Etxebarria, G. 1998, 'Regional systems of innovation: an evolutionary perspective', *Environment and Planning A,* vol. 30, no. 9, pp. 1563-1584.

Coombs, G. (ed.) 2001, *Essays on Regional Economic Development,* South Australian Centre for Economic Studies.

Cooper, D. R. & Schindler, P. S. 2011, *Business Research Methods*, 11th edn, McGraw-Hill, New York.

Costello, A. B. 2005, 'Best Practices in Exploratory Factor Analysis: Four Recommendations for Getting the Most From Your Analysis', *Practical Assessment, Research & Evaluation,* vol. 10, no. 7

Council on Competitiveness 2010, 'Collaborate. Leading Regional Innovation Clusters', in *Regional Innovation Initiative*, Washington, DC.

Couper, M. P. 2000, 'Web Surveys', *Public Opinion Quarterly,* vol. 64, no. 4, pp. 464-494.

Couper, M. P. 2011, 'The Future of Modes of Data Collection', *Public Opinion Quarterly,* vol. 75, no. 5, pp. 889-908.

Crespy, C., Heraud, J.-A. & Perry, B. 2007, 'Multi-level Governance, Regions and Science in France: Between Competition and Equality', *Regional Studies,* vol. 41, no. 8, pp. 1069-1084.

Creswell, J. W. 2009, *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*, 3rd edn, SAGE Publications, Thousand Oaks, California.

Creswell, J. W. 2012, *Educational research: planning, conducting, and evaluating quantitative and qualitative research*, 4th edn, Pearson, Boston, MA.

Creswell, J. W., Fetters, M. D. & Ivankova, N. V. 2004, 'Designing a mixed methods study in primary care', *Annals of Family Medicine,* vol. 2, no. 1, pp. 7-12.

Creswell, J. W. & Plano Clark, V. L. 2011, *Designing and conducting mixed methods research*, 2nd edn, SAGE Publications, Thousand Oaks, California.

Creswell, J. W., Plano Clark, V. L., Gutmann, M. L. & Hanson, W. E. 2003, 'An expanded typology for classifying mixed methods research into designs ', in *Handbook of mixed methods in social and behavioral research,* eds. A. Tashakkori & C. Teddlie*,* SAGE Publications, Thousand Oaks, California.

Cronbach, L. J. 1951, 'Coefficient alpha and the internal structure of thesis', *Psychometrika,* vol. 16, no. 3, pp. 297-334.

Crow, G., Wiles, R., Heath, S. & Charles, V. 2007, 'Research Ethics and Data Quality: The Implications of Informed Consent', *International Journal of Social Research Methodology,* vol. 9, no. 2, pp. 83-95.

Crowe, M. & Sheppard, L. 2012, 'Mind mapping research methods', *Quality & Quantity,* vol. 46, no. 5, pp. 1493-1504.

Crowther, D. & Aras, G. 2008, 'Corporate Social Responsibility', http://www.mdos.si/Files/defining-corporate-social-responsibility.pdf, accessed 16 December 2013.

Cruickshank, M. & McGrath, B. 2000, 'Practical leadership, partnerships and networks in rural development [Paper presented to the Australian and New Zealand Regional Science Association. Conference (23rd: 1999: Newcastle, NSW).]', *Regional Policy and Practice,* vol. 9, no. 1, pp. 26-31.

D'Amato, A., Henderson, S. & Florence, S. 2009, *Corporate social responsibility and sustainable business* Center for Creative Leadership, Greensboro, North Carolina.

Damesick, P. J. 1986, 'Service Industries, Employment and Regional Development in Britain: A Review of Recent Trends and Issues', *Transactions of the Institute of British Geographers,* vol. 11, no. 2, pp. 212-226.

Darwin Port Corporation 2011, 'Australia's Northern gateway of choice', in *2010/11 Annual Report*, Darwin Port Corporation, Darwin, Australia.

Davis, H. C. 1983, 'Regional Port Impact Studies: A Critique and Suggested Methodology', *Transportation Journal,* vol. 23, no. 2, pp. 61-71.

Dawes, J. 2008, 'Do data characteristics change according to the number of scale points used?', *International Journal of Market Research,* vol. 50, no. 1, pp. 61-77.

De Langen, P. W. 2002, 'Clustering and performance: the case of maritime clustering in The Netherlands', *Maritime Policy & Management: The flagship journal of international shipping and port research,* vol. 29, no. 3, pp. 209 - 221.

De Langen, P. W. 2004a, 'Analysing the performance of seaport clusters', in *Shipping and Ports in the Twenty-first Century,* eds. D. Pinder & B. Slack*,* Routledge, London, UK.

De Langen, P. W. 2004b, *The Performance of Seaport Clusters: a framework to analyze cluster performance and an application to the seaport clusters in Durban, Rotterdam and the lower Mississippi,* PhD thesis, Erasmus University Rotterdam, The Netherlands.

De Langen, P. W. 2007, 'Stakeholders, conflicting interests and governance in port clusters', in *Devolution, Port Governance and Port Performance,* eds. M. R. Brooks & K. Cullinane*,* Elsevier, Amsterdam, pp. 457-77.

De Langen, P. W. 2008, 'Ensuring Hinterland Access: The Role of Port Authorities', in *Discussion Paper No. 2008-11*, OECD/ITF.

De Langen, P. W. 2013, 'Performance effects of the corporatisation of Port of Rotterdam Authority', *Proceedings of the International Association of Maritime Economists (IAME) 2013* , Marseille.

Debrie, J., Gouvernal, E. & Slack, B. 2007, 'Port Devolution Revisited: The Case of Regional Ports and the Role of Lower Tier Governments', *Journal of Transport Geography,* vol. 15, no. 6, pp. 455-464.

Denktas-Sakar, G. & Karatas-Cetin, C. 2012, 'Port Sustainability and Stakeholder Management in Supply Chains: A Framework on Resource Dependence Theory', *The Asian Journal of Shipping and Logistics,* vol. 28, no. 3, pp. 301-320.

Department of Transport 2011, *Modern ports: A UK policy*, Department for Transport, http://www2.dft.gov.uk/pgr/shippingports/ports/modern/modernportsaukpolicy.html, accessed 30 August 2011.

Dillman, D. A. 2000, *Mail and Internet Surveys*, 2nd edn, John Wiley & Sons, New York.

Dillman, D. A., Smyth, J. & Christian, L. 2009, *Internet, Mail, and Mixed-Mode Surveys: The Tailored Design Method*, John Wiley & Sons, New York.

Doloreux, D. & Parto, S. 2004, 'Regional Innovation System: A Critical Review', *Proceedings of the ERSA Conference*. pp. 1-26.

Dooms, M., Lugt, L. V. d., Parola, F., Song, D.-W. & Satta, G. 2013, 'A conceptual framework for internationalization strategies of port authorities', *Proceedings of the International Association of Maritime Economists (IAME) 2013*, Marseille.

Dooms, M. & Verbeke, A. 2007, 'Stakeholder management in ports: a conceptual framework integrating insights from research in strategy, corporate social responsibility and port management', *Proceedings of the Proceedings of the Annual Conference of the International Association of Maritime Economists (IAME)*, Athens, Greece.

Dooms, M., Verbeke, A. & Haezendonck, E. 2013, 'Stakeholder management and path dependence in large-scale transport infrastructure development: the port of Antwerp case (1960–2010)', *Journal of Transport Geography,* vol. 27, no. 0, pp. 14-25.

Dotti, N. F. 2012, 'The Unbearable Instability of Structural Funds' Distribution', *European Planning Studies,* vol. 21, no. 4, pp. 596-614.

Ducruet, C. 2007, 'A metageography of port-city relationships', in *Ports, cities, and global supply chains,* eds. J. J. Wang, D. Olivier, T. E. Notteboom & B. Slack, Ashgate, Aldershot, pp. 157-172.

Ducruet, C. 2009, 'Port Regions and Globalization', in *Ports in Proximity: competition and coordination among adjacent seaports,* eds. T. Notteboom, C. Ducruet & P. D. Langen, Ashgate Surrey.

Ducruet, C. & Zaidi, F. 2012, 'Maritime constellations: a complex network approach to shipping and ports', *Maritime Policy & Management,* vol. 39, no. 2, pp. 151-168.

Dunford, M. 1990, *Regional development models*, http://www.geog.susx.ac.uk/research/eggd/ege/pdf/modelsrd.pdf, accessed 19 August 2010

EconSearch 2001, 'The Economic Impact of the Port of Esperance', in *a report prepared for Esperance Port Authority*, Port of Esperance, Western Australia.

EconSearch 2009, 'Port of Port Kembla Economic Impact Study', in *a report prepared for Port Kembla Port Corporation*, Port of Port Kembla, New South Wales.

EconSearch 2012, 'Economic Impact of the Port of Geelong', in *a report prepared for Victorian Regional Channels Authority*, Victorian Regional Channels Authority, Victoria, Australia.

Erzberger, C. & Kelle, U. 2003, 'Making inferences in mixed methods: the rules of integration', in *Handbook of Mixed Methods in Social & Behavioral Research,* eds. A. Tashakkori & C. Teddlie, SAGE Publications, Thousand Oaks, CA, pp. 457-488.

ESPO 2004, 'Ports creating opportunities', in *Crossroads of Transport Networks*, European Sea Ports Organisation (ESPO), Brussels.

ESPO 2010, 'Code of Practice on Societal Integration of Ports', in *ESPO report*, European Sea Ports Organisation (ESPO), Brussels.

ESPO 2012a, *ESPO Annual Awards 2009-2012*, European Sea Ports Organisation (ESPO), http://www.espo.be/index.php?option=com_content&view=article&id=94&Itemid=87, accessed 21 Dec 2012.

ESPO 2012b, 'Towards excellence in port environmental management and sustainability', in *ESPO Green Guide*, European Sea Ports Organisation (ESPO), Brussels.

Estache, A., González, M. & Trujillo, L. 2002, 'Efficiency Gains from Port Reform and the Potential for Yardstick Competition: Lessons from Mexico', *World Development,* vol. 30, no. 4, pp. 545-560.

Estache, A. & Trujillo, L. 2009, 'Global economic changes and the future of port authorities', in *Future Challenges for the Port and Shipping Sector,* eds. H. Meersman, E. V. d. Voorde & T. Vanelslander*,* Informa, London, UK.

Etzkowitz, H. & Ranga, M. 2010, 'A Triple Helix System for Knowledge-based Regional Development: From "Spheres" to "Spaces"', in *Theme paper for Tripe Helix 8 International Conference*, Madrid.

European Union 2010, 'Regional policy, an integrated approach', in *Panorama*, European Union Regional Policy, Brussels.

Evans, S. R. & Hutchins, M. 2002, 'The Development of strategic transport assets in greater Manchester and Merseyside: Does local governance matter?', *Regional Studies,* vol. 36, no. 4, pp. 429-438.

Everett, S. 2003, 'Corporatization: a legislative framework for port inefficiencies', *Maritime Policy & Management,* vol. 30, no. 3, pp. 211-219.

Everett, S. 2007, 'Port reform in Australia: regulation constraints on efficiency', *Maritime Policy & Management,* vol. 34, no. 2, pp. 107-119.

Everett, S. 2009, *Monograph series in chain systems analysis*, The Centre for Integrated Freight Systems Management, The University of Melbourne, Melbourne.

Everett, S. & Kittel, C. 2010, 'Sustainability and Australian coastal shipping: Some issues'*, Proceedings of the Conference on Sustainable Transport in the Asia-Indo-Pacific: Varied Contexts-Common Aims*, 2-4 June 2010, Melbourne.

Everett, S. & Robinson, R. 2013, 'Effective implementation of a national ports strategy for Australia: Some jurisdictional and constitutional issues'*, Proceedings of the IAME Conference 2013*, Marseille.

Eversole, R. 2003, 'Value-Adding Community? Community Economic Development in Theory & Practice', *Rural Society,* vol. 13, no. 1

Eversole, R. & Martin, J. (eds) 2005, *Participation and Governance in Regional Development: Global Trends in an Australian Context,* Ashgate, Hampshire.

Fallah, M. H. & Ibrahim, S. 2004, 'Knowledge spillover and innovation in technological clusters', *Proceedings of the 13th International*

Conference on Management of Technology (IAMOT). Vienna, pp. CD.

Fawcett, J. A. 2007, 'Port governance and privatization in the United States: Public ownership and private operation', in *Devolution, Port Governance and Port Performance,* ed. M. Dresner*,* Elsevier, Oxford, UK.

Ferrari, C. 2011, 'Ports and regional economic development', in *Global ports and urban development: Challenges and opportunities*, OECD.

Ferrari, C., Merk, O., Bottasso, A., Conti, M. & Tei, A. 2012, 'Ports and Regional Development: a European Perspective', in *OECD Regional Development Working Papers*, OECD Publishing, Paris.

Field, A. 2009, *Discovering statistics using SPSS* 3rd edn, Sage Publications, London.

Fleming, D. K. 1987, 'The port community: an American view', *Maritime Policy & Management,* vol. 14, no. 4, pp. 321-336.

Fleurke, F. & Willemse, R. 2006, 'The European Union and the autonomy of sub-national authorities: Towards an analysis of constraints and opportunities in sub-national decision-making', *Regional & Federal Studies,* vol. 16, no. 1, pp. 83-98.

Florida, R. 2002, 'Entrepreneurship, Creativity, and Regional Development', in *David Hart volume on Entrepreneurship*, Carnegie Mellon University, Pittsburgh.

Foster, M. 2000, 'New Approaches to Development Co-operation: What can we learn from experience with implementing Sector Wide Approaches?', in *Working Paper 140*, Centre for Aid and Public Expenditure, Overseas Development Institute, London.

Fox, J. M. 2005, 'Factors Extension organizations can develop to improve performance', in *Organizational Entrepreneurship: Empowerment through education*, The Ohio State University, Ohio.

Fransen, J. A. A. J. 2013, 'Maritime Affairs and CSR: CSR, Credits from Society or Is It More?', in *Newsletter 43,* ed. Friends of WMU Japan, The Ocean Policy Research Foundation, Tokyo.

Frech, R. 2005, 'A Human Rights-Based Approach to Regional Development', in *BIM Tool 4*, Ludwig Boltzmann Institute of Human Rights, Vienna.

Freeman, R. & Freeman, R. E. 2010, *Stakeholder Theory: The State of the Art*, Cambridge University Press.

Freeman, R. E. 1984, *Strategic Management: A Stakeholder Approach*, Pitman, Boston.

Fricker, R. D. 2008, 'Sampling Methods for Web and E-mail Surveys', in *Handbook of online research methods,* eds. N. Fielding, R. M. Lee & G. Blank, Sage, London.

Fujita, M. & Mori, T. 1996, 'The role of ports in the making of major cities: Self-agglomeration and hub-effect', *Journal of Development Economics,* vol. 49, no. 1, pp. 93-120.

Gaffikin, F. & Morrissey, M. 2001, 'Regional Development - An integrated approach?', *Local Economy,* vol. 16, no. 1, pp. 63 - 71.

Gajewski, G. R., Bathiche, T. G. & Wilczewski, K. M. 2007, 'A New Infrastructure-Led Regional Development Approach to Promote More Equitable Globalization in Asia', *Proceedings of the 4th Civil Engineering Conference in the Asian Region (CECAR)*. Taipei, Taiwan, pp. 1-10.

Gaskin, J. 2013a, *Confirmatory Factor Analysis*, http://statwiki.kolobkreations.com/wiki/Confirmatory_Factor_Analysis, accessed 12 Sept 2013.

Gaskin, J. 2013b, *EFA Demonstration*, http://www.youtube.com/watch?v=jNDD5WSsOXI, accessed 26 August 2013.

Gaskin, J. 2013c, *Exploratory Factor Analysis*, http://statwiki.kolobkreations.com/wiki/Exploratory_Factor_Analysis, accessed 12 Sept 2013.

Gaskin, J. 2013d, *Model fit during a Confirmatory Factor Analysis (CFA) in AMOS*, http://www.youtube.com/watch?v=JkZGWUUjdLg, accessed 11 Sept 2013.

Gawel, A. 2013, 'Innovation as a factor in regional development: the evidence from Poland', *Interdisciplinary Studies Journal,* vol. 2, no. 4, pp. 9-23.

GBRMPA 2013, 'Ports and Shipping Information Sheet', *Ports in the Great Barrier Reef*, http://www.gbrmpa.gov.au/__data/assets/pdf_file/0009/28809/Ports-in-the-Great-Barrier-Reef.pdf, accessed 01 October 2013.

Ghashat, H. M. 2012, *The Governance of Libyan Ports: Determining a Framework for Successful Devolution,* PhD thesis, Edinburgh Napier University, Edinburgh.

GHD 2010a, 'Analysis of landside costs and the potential for container productivity gains', in *Background Paper 3 for the NPS*, Infrastructure Australia and the National Transport Commission, Canberra.

GHD 2010b, 'Current port planning practices in Australia', in *Background Paper 2 for the NPS*, Infrastructure Australia and the National Transport Commission, Canberra.

GHD 2010c, 'Effective port governance and project evaluation', in *Background Paper 1 for the NPS*, Infrastructure Australia and the National Transport Commission, Canberra.

GHD 2010d, 'Examples of best practice port planning overseas', in *Background Paper 4 for the NPS*, Infrastructure Australia and the National Transport Commission, Canberra.

GHD 2010e, 'The possible future market challenges for relevant ports', in *Background Paper 5 for the NPS*, Infrastructure Australia and the National Transport Commission, Canberra.

GHD 2013, 'Environmental Best Practice Port Development: An Analysis of International Approaches', in *Report prepared for the Department of Sustainability, Environment, Water, Population and Communities*, Canberra, Australia.

Golafshani, N. 2003, 'Understanding reliability and validity in qualitative research', *Qualitative Report,* vol. 8, no. 4, pp. 597-607.

Gosling, S. D., Vazire, S., Srivastava, S. & John, O. P. 2004, 'Should We Trust Web-Based Studies? A Comparative Analysis of Six Preconceptions About Internet Questionnaires', *American Psychologist,* vol. 59, no. 2, pp. 93-104.

Goss, R. O. 1990a, 'Economic policies and seaports: Are port authorities necessary?', *Maritime Policy & Management,* vol. 17, no. 4, pp. 257-271.

Goss, R. O. 1990b, 'Economic policies and seaports: Strategies for port authorities', *Maritime Policy & Management,* vol. 17, no. 4, pp. 273-287.

Goss, R. O. 1990c, 'Economic policies and seaports: The economic functions of seaports', *Maritime Policy & Management: The flagship journal of international shipping and port research,* vol. 17, no. 3, pp. 207 - 219.

Government of South Australia 2008, *Review of Significant Ports in South Australia*, Department for Transport Energy and Infrastructure, http://www.dpti.sa.gov.au/__data/assets/pdf_file/0003/34752/v6-

Report on CIRA Clause 4 Review of Port Adelaide.pdf, accessed 29 April 2012.

Government of Western Australia 2011a, 'Issues Paper', in *WA Ports Review*, Department of Transport, Perth.

Government of Western Australia 2011b, 'Ports Handbook 2011', in *Ports WA*, Department of Transport, Perth.

Government of Western Australia 2012, 'Ports Governance Review Implementation', in *Communique*, Department of Transport, Perth.

Greene, J. C., Caracelli, V. J. & Graham, W. F. 1989, 'Towards a conceptual framework for mixed-method evaluation designs', *Educational Evaluation and Policy Analysis,* vol. 11, no. 3, pp. 255-274.

Grobar, L. M. 2008, 'The Economic Status of Areas Surrounding Major U.S. Container Ports: Evidence and Policy Issues', *Growth and Change,* vol. 39, no. 3, pp. 497-516.

Grolleau, G., Galochkin, I. & Sutan, A. 2012, 'Escaping the Zero-Sum Game of Positional Races', *KYKLOS,* vol. 65, no. 4, pp. 464-479.

Groves, R. M. 1989, *Survey errors and survey costs*, Wiley, New York.

Guest, G., Bunce, A. & Johnson, L. 2006, 'How Many Interviews Are Enough?: An Experiment with Data Saturation and Variability', *Field Methods,* vol. 18, no. 1, pp. 59-82.

Guest, G. & McLellan, E. 2003, 'Distinguishing the trees from the forest: Applying cluster analysis to thematic qualitative data', *Field Methods,* vol. 15, no. 2, pp. 186-201.

Guoqiang, Z., Ning, Z. & Wang, Q. 2005, 'Container Ports Development and Regional Economic Growth: An Empirical Ressearch on the Pearl River Delta Region of China', *Proceedings of the Proceedings of the Eastern Asia Society for Transportation Studies*. Bangkok, pp. 2136-2150.

Haddad, E. A., Hewings, G. J. D. & Santos, R. A. 2005, 'Port Efficiency and Regional Development', *Proceedings of the Joint conference on 'Regulation, Competition and Income Distribution: Latin American Experiences'*, November 18-21, Paraty, Rio de Janeiro, Brazil.

Haezendonck, E. 2001, *Essays on strategy for seaport analysis*, Garant, Leuven.

Haezendonck, E. & Dooms, M. 2007, 'Environmental strategy for ports: towards a green network approach', *Proceedings of the IAME 2007*. Athens, pp.

Haezendonck, E., Dooms, M. & Verbeke, A. 2010, 'Socio-economic impact of ports: Development of a European port economic impact toolkit ', *Proceedings of the 2010 Annual Conference of the International Association of Maritime Economists*, Lisbon, Portugal.

Haggett, P. 1972, *Geography: a modern synthesis*, 1st edn, Harper & Row, New York and London.

Hailey, R. 2011, 'Australia to privatise Port Botany', *Lloyd's List*, http://www.lloydslist.com/ll/sector/ports-and-logistics/article379221.ece, accessed 06 September 2011.

Hair, J., Black, W., Babin, B. & Anderson, R. 2010, *Multivariate data analysis*, 7th edn, Prentice Hall, Upper Saddle River, NJ, USA.

Hair, J. F., Anderson, R. E., Tatham, R. L. & Black, W. C. 1998, *Multivariate data analysis with readings*, Prentice Hall, New Jersey.

Halkier, H., Dahlström, M., James, L., Manniche, J. & Olsen, L. S. 2010, 'Knowledge Dynamics, Regional Development and Public Policy', in *EURODITE*, The Sixth Framework Programme of the European Union, Aalborg, Denmark.

Hall, P., McCalla, R. J., Comtois, C. & Slack, B. (eds) 2011, *Integrating Seaports and Trade Corridors,* Ashgate, Surrey, England.

Hall, P. V. 2002, *The Institution of Infrastructure and the Development of Port-Regions,* PhD thesis, University of California, Berkeley.

Hall, P. V. & Jacobs, W. 2010, 'Shifting Proximities: The Maritime Ports Sector in an Era of Global Supply Chains', *Regional Studies,* vol. 44, no. 9, pp. 1103-1115.

Hall, P. V., O'Brien, T. & Woudsma, C. 2010, 'Improving environmental performance through innovation: The role of stakeholder collaboration in west coast port gateways', *Proceedings of the 2010 Annual Conference of the International Association of Maritime Economists*, 7-9 July 2010, Lisbon, Portugal.

Hammersley, M. 1987, 'Some Notes on the Terms 'Validity' and 'Reliability'', *British Educational Research Journal,* vol. 13, no. 1, pp. 73-81.

Haralambides, H. E. 1997, 'Ports and Regional Development in Europe: A historical Perspective', in *Report submitted to the European*

Commission in the context of its preparation of the 'Green Paper on Ports and Maritime Infrastructure'.

Hardy, M. & Bryman, A. (eds) 2004, *Handbook of data analysis,* Sage, London.

Harmaakorpi, V. 2006, 'Regional Development Platform Method (RDPM) as a tool for regional innovation policy', *European Planning Studies,* vol. 14, no. 8, pp. 1085-1104.

Haynes, K. E., Hsing, Y. M. & Stough, R. R. 1997, 'Regional port dynamics in the global economy: The case of Kaohsiung', *Maritime Policy & Management,* vol. 24, no. 1, pp. 93-113.

Henderson, A. 2010, 'Why Regions Matter: Sub-state Polities in Comparative Perspective', *Regional & Federal Studies,* vol. 20, no. 4-5, pp. 439-445.

Hesse-Biber, S. & Griffin, A. J. 2013, 'Internet-Mediated Technologies and Mixed Methods Research: Problems and Prospects', *Journal of Mixed Methods Research,* vol. 7, no. 1, pp. 43-61.

Hesse-Biber, S. N. 2010, *Mixed Methods Research: Merging theory with practice* The Guilford Press, New York & London.

Himmelman, A. T. 2002, *Collaboration for a Change: Definitions, decision-making models, roles, and collaboration process guide*, HIMMELMAN Consulting, Minneapolis.

Hinds, A. A. 2008, 'Doing well by doing good: ports and the sustainability challenge', in *a powerpoint presentation in AAPA Port Finance Seminar, June 10-12, 2008*, American Association of Port Authorities (AAPA), Virginia.

Hogarty, K. Y., Hines, C. V., Kromrey, J. D., Ferron, J. M. & Mumford, K. R. 2005, 'The Quality of Factor Solutions in Exploratory Factor Analysis: The Influence of Sample Size, Communality, and Overdetermination', *Educational and Psychological Measurement,* vol. 65, no. 2, pp. 202-226.

Homsombat, W., Yip, T. L., Yang, H. & Fu, X. 2013, 'Regional cooperation and management of port pollution', *Maritime Policy & Management,* vol. 40, no. 5, pp. 451-466.

Hornborg, A. 2009, 'Zero-Sum World: Challenges in Conceptualizing Environmental Load Displacement and Ecologically Unequal Exchange in the World-System', *International Journal of Comparative Sociology,* vol. 50, no. 3-4, pp. 237-262.

Hoskisson, R. E., Hitt, M. A., Wan, W. P. & Yiu, D. 1999, 'Theory and research in strategic management: Swings of a pendulum', *Journal of Management,* vol. 25, no. 3, pp. 417-456.

House of Commons Transport Committee 2007, 'The Ports Industry in England and Wales', in *Second Report of Session 2006-07*, House of Commons, UK, London.

House of Representatives 2012, 'Coastal Trading (Revitalising Australian Shipping) Bill 2012', in *Parliamentary Debates: House of Representatives Bills- Second Reading Speech*, Commonwealth of Australia, Canberra.

Hoyle, B. 2000, 'Global and Local Change on the Port-City Waterfront', *Geographical Review,* vol. 90, no. 3, pp. 395-417.

Hudson, C. 2005, 'Regional development partnerships in Sweden: Putting the government back in governance?', *Regional & Federal Studies,* vol. 15, no. 3, pp. 311 - 327.

Ibsen, C. L. & Poulsen, L. S. 2007, 'Path dependence and independent utility regulation: The case of Danish energy and telecommunications regulation', *Scandinavian Economic History Review,* vol. 55, no. 1, pp. 41-63.

Infrastructure Australia 2010a, *National Ports Strategy*, Author, http://www.infrastructureaustralia.gov.au/gateways/files/National_Ports_Strategy_DEC2010_v2.pdf, accessed 5 October 2010.

Infrastructure Australia 2010b, 'National ports strategy', in *Background paper*, Infrastructure Australia and the National Transport Commission, Canberra, Australia.

Infrastructure Australia 2010c, *National Ports Strategy Public Consultation*, Author, http://www.infrastructureaustralia.gov.au/public_submissions/nps/index.aspx, accessed 5 October 2010.

Infrastructure Australia 2011, *National Land Freight Strategy*, Author, http://www.infrastructureaustralia.gov.au/publications/files/NLFS_220211.pdf, accessed 27 January 2012.

Infrastructure Australia 2012, *National Land Freight Strategy*, Author, http://www.scoti.gov.au/publications/files/National_Land_Freight_Strategy_Compressed.pdf, accessed 27 January 2012.

Infrastructure Partnerships Australia 2007, 'Integrated Infrastructure Planning –A New Way Forward', in *A case study- Sydney airport and Port Botany precinct*, Infrastructure Partnership Australia, Sydney, Australia.

Infrastructure Partnerships Australia 2009a, *Meeting the 2050 Freight Challenge, a discussion paper prepared by PricewaterhouseCoopers Australia*, Infrastructure Partnership Australia.

Infrastructure Partnerships Australia 2009b, *Submission to Infrastructure Australia on the National Ports Strategy*, Infrastructure Australia.

ISO 2013, *ISO 26000 - Social responsibility*, International Organization for Standardization, http://www.iso.org/iso/home/standards/iso26000.htm, accessed 12 August 2013.

Israel, M. & Hay, I. 2006, *Research ethics for social scientists*, Sage, London.

Iyer, S., Kitson, M. & Toh, B. 2005, 'Social capital, economic growth and regional development', *Regional Studies,* vol. 39, no. 8, pp. 1015-1040.

Jang, E. E., McDougall, D. E., Pollon, D., Herbert, M. & Russell, P. 2008, 'Integrative Mixed Methods Data Analytic Strategies in Research on School Success in Challenging Circumstances', *Journal of Mixed Methods Research,* vol. 2, no. 3, pp. 221-247.

Jing, L. & Qing, X. 2009, 'The port effect on Liaoning economic development', *2009 IEEE International Conference on Automation and Logistics (ICAL)*, pp. 1127-30|1138.

Johansen, B. & Wedderkopp, N. 2010, 'Comparison between data obtained through real-time data capture by SMS and a retrospective telephone interview', *Chiropractic & Osteopathy,* vol. 18, no. 10

Johnson, R. B., Onwuegbuzie, A. J. & Turner, L. A. 2007, 'Towards a definition of mixed methods research', *Journal of mixed methods research,* vol. 1, no. 2, pp. 112-133.

Johnston, A. 2009, 'Which Sectors Drive Regional Economic Development? Changes in Employment in Knowledge-based and Consumption-based Sectors and Regional Economic Performance', *Local Economy,* vol. 24, no. 2, pp. 125 - 139.

Jung, B.-M. 2011, 'Economic Contribution of Ports to the Local Economies in Korea', *The Asian Journal of Shipping and Logistics,* vol. 27, no. 1, pp. 1-30.

Kemper, E. A., Stringfield, S. & Teddlie, C. 2003, 'Mixed methods sampling strategies in social science research', in *Handbook of Mixed Methods in Social & Behavioral Research,* eds. A.

Tashakkori & C. Teddlie, SAGE Publications, Thousand Oaks, CA, pp. 273-296.

Kennedy, J. E. 2005, 'Grey matter: ambiguities and complexities of ethics in research ', *Journal of Academic Ethics,* vol. 3, no. 2, pp. 143-158.

Kenny, D. A. & McCoach, D. B. 2003, 'Effect of the Number of Variables on Measures of Fit in Structural Equation Modeling', *Structural Equation Modeling: A Multidisciplinary Journal,* vol. 10, no. 3, pp. 333-351.

Ketikidis, P., Zigiaris, S. & Zaharis, N. 2010, 'Regional Innovation and Competitiveness: Analysis of the Thessaloniki Metropolitan Region', *Proceedings of the Academic Conferences International Limited*, 09 Sep 2010, Reading.

Kettunen, P. & Kungla, T. 2005, 'Europeanization of sub-national governance in unitary states: Estonia and Finland', *Regional & Federal Studies,* vol. 15, no. 3, pp. 353-378.

Khan, R. E. 2011, *Developing the theoretical and conceptual framework [Power Point Slides]*, http://journclasses.pbworks.com/f/theoretical+framework.ppt, accessed 06 August 2012.

Kohli, A. S. & Jensen, J. B. 2010, 'Assessing effectiveness of supply chain collaboration: An empirical study', *Supply Chain Forum,* vol. 11, no. 2

Kostopoulos, K. C. 2002, 'The Resource – Based View of the Firm and Innovation: Identification of Critical Linkages', http://ecsocman.hse.ru/data/165/663/1219/rb_view.pdf, accessed 15 November 2013.

Kozuch, B. 2009, 'The culture of collaboration: Theoretical aspects', *Journal of Intercultural Management,* vol. 1, no. 2, pp. 17-29.

Kuhnen, F. 2013, *Regional development — overcoming sectoral development approaches*, http://www.professor-frithjof-kuhnen.de/publications/sustainability-regional-development-marginal-location/3.htm, accessed 14 November 2013.

Kwak, N. & Radler, B. 2002, 'A comparison between mail and web surveys: Response pattern, respondent profile, and data quality', *Journal of Official Statistics,* vol. 18, no. 2, pp. 257-273.

Lam, L. & Iskounen, A. 2008, *Feeder ports, Inland ports and Corridors-Time for a closer look*, Porttek International Ltd, http://www.portek.com/publications/FeederPort_InlandPortsandCorridors_TimeforaCloserLook.pdf, accessed 31 August 2012.

Lee, D. R. 2012, 'The Keynesian Path to Fiscal Irresponsibility', *Cato Journal,* vol. 32, no. 3, pp. 473-491.

Lee, E.-S. & Song, D.-W. 2010, 'Knowledge management for maritime logistics value: discussing conceptual issues', *Maritime Policy & Management,* vol. 37, no. 6, pp. 563-583.

Lee, E. S. 2010, 'Knowledge Resource in Maritime Transport Industry: A Case Analysis', *The Asian Journal of Shipping and Logistics,* vol. 26, no. 2, pp. 297-340.

Lee, S. W., Song, D. W. & Ducruet, C. 2008, 'A Tale of Asia's World Ports: The Spatial Evolution in Global Hub Port Cities', *Geoforum,* vol. 39, no. 1, pp. 372-385.

Leech, N. L. & Onwuegbuzie, A. J. 2009, 'A typology of mixed methods research designs', *Qual Quant,* vol. 43, no. 3, pp. 265-275.

Leedy, P. D. & Ormrod, J. E. 2010, *Practical research: planning and design*, 9th edn, Pearson Education, Upper Saddle River, New Jersey.

Lepkowski, J. M., Japec, L., Tucker, C., Lavrakas, P. J., Brick, J. M., Link, M. W., Leeuw, E. D. & Sangster, R. L. (eds) 2008, *Advances in telephone survey methodology,* John Wiley & Sons, new jersey.

Leshem, S. & Trafford, V. 2007, 'Overlooking the conceptual framework', *Innovations in Education and Teaching International,* vol. 44, no. 1, pp. 93-105.

Li, J., Lu, J. & Xiang, N. 2008, 'The Impact of Port Development on Regional Economy', *2008 Ieee International Conference on Automation and Logistics, Vols 1-6*, pp. 672-676.

LINC 2006, *Land Freight Growth in Australia*, Logistics Information & Navigation Centre, http://www.talc.com.au/Portals/10/Land%20Freight%20Growth%20in%20Australia.pdf, accessed 10 March 2012.

Liou, K. T. 2000a, 'Applying strategic management to economic development: benefits and challenges', *International Journal of Public Administration,* vol. 23, no. 9, pp. 1621 - 1649.

Liou, K. T. 2000b, 'Regional and local economic development issues in the united states -- The importance of regional and local economic development', *International Journal of Public Administration,* vol. 23, no. 9, pp. 1531 - 1539.

Llerena, P. & Matt, M. (eds) 2005, *Innovation Policy in a Knowledge-Based Economy: Theory and Practice,* Springer, Berlin, Germany.

Llewellyn, R. 2009, *Stakeholder Management Overview*, PM Hut, http://www.pmhut.com/stakeholder-management-overview, accessed 14 August 2013.

Lugt, L. v. d., Langen, P. d. & Hagdorn, L. 2013, 'Beyond the landlord: Typologies of port authority strategies', *Proceedings of the International Association of Maritime Economists (IAME) 2013*, Marseille.

Magala, M. 2004, *Opportunity Capture and Growth Strategies for Regional Ports: A Modelling Approach,* PhD thesis, Victoria University, Melbourne, Australia.

Magala, M. 2008, 'Modelling opportunity capture: a framework for port growth', *Maritime Policy & Management,* vol. 35, no. 3, pp. 285-311.

Malecki, E. 2004, 'Jockeying for Position: What It Means and Why It Matters to Regional Development Policy When Places Compete', *Regional Studies,* vol. 38, no. 9, pp. 1101-1120.

Mangan, J. & Cunningham, J. 2000, 'Irish ports: commercialisation and strategic change', *Business Strategy Review,* vol. 11, pp. 51-60.

Markland, D. 2007, 'The golden rule is that there are no golden rules: A commentary on Paul Barrett's recommendations for reporting model fit in structural equation modelling', *Personality and Individual Differences,* vol. 42, no. 5, pp. 851-858.

Martin, P. & Rogers, C. A. 1995, 'Industrial location and public infrastructure', *Journal of International Economics,* vol. 39, no. 3–4, pp. 335-351.

Martinez-Vazquez, J. & Vaillancourt, F. 2008, *Public Policy for Regional Development*, 1 edn, Routledge, New York.

Mas-Verdu, F., Ribeiro Soriano, D. & Roig Dobon, S. 2010, 'Regional development and innovation: the role of services', *The Service Industries Journal,* vol. 30, no. 5, pp. 633 - 641.

Maude, A. 2004, 'Regional development processes and policies in Australia: a review of research 1990–2002', *European Planning Studies,* vol. 12, no. 1, pp. 3 - 26.

Maudrich, E. 2000, 'Description of impacts of new technologies on port related regional development', in *BALTIC Transport Communication and Regional Development: Deliverable 3.2, INTERREG II C* ed. J. Obenbrugge, European Regional Development Fund.

Maybury, D. & Tang, M. 2012, *Australian Shipping Industry Reform - Coastal Trading Bill*, Norton Rose Fulbright, http://www.nortonrosefulbright.com/au/knowledge/publications/61828/australian-shipping-industry-reform--coastal-trading-bill?utm_source=Mondaq&utm_medium=syndication&utm_campaign=inter-article-link, accessed 02 April 2014.

McCalla, R. J. 1999, 'Global change, local pain: intermodal seaport terminals and their service areas', *Journal of Transport Geography,* vol. 7, no. 4, pp. 247-254.

McCann, P. 2001, 'Chapter 4: Regional Specialization, Trade, and Multiplier Analysis', in *Urban & Regional Economics*, Oxford University Press, London, pp. 137-174.

McLachlan, R., Gilfillan, G. & Gordon, J. 2013, 'Deep and persistent disadvantage in Australia ', in *Productivity Commission Staff Working Paper*, Productivity Commission, Canberra, Australia.

McLaughlin, H. & Fearon, C. 2013, 'Understanding the development of port and regional relationships: a new cooperation/competition matrix', *Maritime Policy & Management,* vol. 40, no. 3, pp. 278-294.

McQuitty, S. 2004, 'Statistical power and structural equation models in business research', *Journal of Business Research,* vol. 57, no. 2, pp. 175-183.

Merk, O. (ed.) 2013, *The Competitiveness of Global Port-Cities: Synthesis Report,* OECD Publishing.

Merk, O. & Notteboom, T. 2013, 'The Competitiveness of Global Port-Cities: the Case of Rotterdam, Amsterdam - the Netherlands', in *OECD Regional Development Working Papers, 2013/08*, OECD Publishing.

Meyrick and Associates 2007, 'International and Domestic Shipping and Ports Study', in *Report prepared for DTEI on behalf of the Australian Maritime Group (AMG)*, Meyrick Consulting Group Pty Ltd, Wollongong, pp. 1-166.

Meyrick and Associates & EconSearch 2007, 'Economic Impact Study: Port of Hastings', in *Report prepared for Port of Hastings Corporation and the Victorian Department of Infrastructure*, Port of Hastings Corporation, Victoria, Australia, pp. 1-166.

Miller, S. 2003, 'Impact of mixed methods and design on inference quality', in *Handbook of Mixed Methods in Social & Behavioral Research,* eds. A. Tashakkori & C. Teddlie, SAGE Publications, Thousand Oaks, CA, pp. 423-455.

Minckler, C. H. 2011, *Teacher Social Capital: The Development of a Conceptual Model and Measurement Framework with Application to Educational Leadership and Teacher Efficacy,* PhD thesis, University of Louisiana, Lafayette.

Moglia, F. & Sanguineri, M. 2003, 'Port Planning: the Need for a New Approach?', *Maritime Economics & Logistics,* vol. 5, no. 4, pp. 413-413-425.

Molina-Azorin, J. F. 2011, 'The Use and Added Value of Mixed Methods in Management Research', *Journal of Mixed Methods Research,* vol. 5, no. 1, pp. 7-24.

Molina-Azorin, J. F. 2012, 'Mixed Methods Research in Strategic Management: Impact and Aplications ', *Organizational Research methods,* vol. 15, no. 1, pp. 33-56.

Monios, J. & Wilmsmeier, G. 2012, 'Port-centric logistics, dry ports and offshore logistics hubs: strategies to overcome double peripherality?', *Maritime Policy & Management,* vol. 39, no. 2, pp. 207-226.

Monson 2013, *Northern Territory - Bing Bong*, Monson Agencies Australia, http://www.monson.com.au/wp-content/uploads/nt_bingbong.pdf, accessed 11 December 2013.

Morgan, D. L. 2007, 'Paradigms Lost and Pragmatism Regained', *Journal of Mixed Methods Research,* vol. 1, no. 1, pp. 48-76.

Morse, J. M. 2003, 'Principles of mixed methods and multimethod research design', in *Handbook of Mixed Methods in Social & Behavioral Research,* SAGE Publications, Thousand Oaks, CA, pp. 189-208.

Moulaert, F. & Mehmood, A. 2010, 'Analysing Regional Development and Policy: A Structural–Realist Approach', *Regional Studies,* vol. 44, no. 1, pp. 103 - 118.

MUA 2007, *Review of current port competition and regulation in Queensland*, Maritime Union of Australia (MUA), http://www.tmr.qld.gov.au/~/media/5e4c14b8-efec-4621-bf49-375a1a7821f5/pdf_coag_port_review_mua_submission.pdf, accessed 27 April 2012.

MUA 2008, *Inquiry into coastal shipping policy and regulation*, Maritime Union of Australia (MUA), http://www.aph.gov.au/house/committee/itrdlg/coastalshipping/subs/sub45.pdf, accessed 26 September 2010.

Mueller, S. 2014, 'Constitutional Dynamics in Federal Systems: Sub-National Perspectives', *Regional & Federal Studies*, pp. 1-2.

Müller, B. 2008, 'Still Feeding the World? The Political Ecology of Canadian Prairie Farmers', *Anthropologica,* vol. 50, no. 2, pp. 389-407.

Musso, E., Benacchio, M. & Claudio, F. 2000, 'Ports and Employment in Port Cities', *International Journal Maritime Economics,* vol. 2, no. 4, pp. 283-311.

Namey, E., Guest, G., Thairu, L. & Johnson, L. 2008, 'Data reduction techniques for large qualitative data sets', in *Handbook for team-based qualitative research,* eds. G. Guest & K. M. MacQueen, AltaMira Plymouth.

Nastasi, B. K., Hitchcock, J., Sarkar, S., Burkholder, G., Varjas, K. & Jayasena, A. 2007, 'Mixed Methods in Intervention Research: Theory to Adaptation', *Journal of Mixed Methods Research,* vol. 1, no. 2, pp. 164-182.

Nermend, K. 2009, *Vector Calculus in Regional Development Analysis*, Physica-Verlag.

New South Wales Government 1995, *Ports and Maritime Administration Act 1995*, New South Wales Government, Sydney.

New South Wales Government 2007, 'Review of Port Competition and Regulation in NSW', in *Consistency with the Competition and Infrastructure Reform Agreement*, PriceWaterhouseCoppers, Sydney.

Newlyn, R. 2009, 'A National Strategy for Australian Port Development', *Proceedings of the WA Port Authorities Conference (presentation slides)*, Sydney, Australia.

NFF 2010, *National Ports Strategy submission of National Farmer's Federation (NFF)*, Infrastructure Australia, http://www.infrastructureaustralia.gov.au/public_submissions/nps/files/10_015NationalFarmersFederation.pdf, accessed 31 January 2012.

Niemi, A. W. & Jn 1975, 'Patterns of regional economic change (Book Review)', *Journal of Economic Literature,* vol. 13, no. 3, p. 958.

Nischalke, T. & Schöllmann, A. 2005, 'Regional development and regional innovation policy in New Zealand: Issues and tensions in a small remote country', *European Planning Studies,* vol. 13, no. 4, pp. 559 - 579.

NMU 2010, *Northern Maritime University, North Sea Region* http://www.nm-uni.eu/news/197-maritime-policy-and-management-call-for-paper, accessed June 14, 2010.

Norris, D. F. 2001, 'Prospects for regional governance under the new regionalism: Economic imperatives versus political impediments', *Journal of Urban Affairs Association,* vol. 23, no. 5, pp. 557-571.

North, D. 1990, *Institutions, Institutional change, and Economic Performance*, Cambridge University Press, Cambridge.

Northern Territory Government 2009, 'Review of the Regulatory Framework for the Port of Darwin', in *Final Report*, Northern Territory Treasury, Darwin.

Notteboom, T. 2009, 'Path Dependency and Contingency in the Development of Multi-port Gateway Regions and Multi-port Hub Regions', in *Ports in Proximity,* eds. T. Notteboom, C. Ducruet & P. De Langen*,* Ashgate Publishing Limited, Surrey, England.

Notteboom, T., Ducruet, C. & De Langen, P. W. (eds) 2009, *Ports in Proximity,* Ashgate Publishing Limited, Surrey, England.

Notteboom, T. & Rodrigue, J.-P. 2007, *Re-assessing port-hinterland relationships in the context of global commodity chains*, Hofstra University, http://people.hofstra.edu/Jean-paul_Rodrigue/downloads/Ashgate-Notteboom-Rodrigue-draft%20final.pdf, accessed 12 August 2011.

Notteboom, T. E. & Rodrigue, J.-P. 2005, 'Port regionalization: towards a new phase in port development', *Maritime Policy & Management,* vol. 32, no. 3, pp. 297-313.

Notteboom, T. E. & Winkelmans, W. 2001, 'Structural changes in logistics: how will port authorities face the challenge?', *Maritime Policy & Management: The flagship journal of international shipping and port research,* vol. 28, no. 1, pp. 71 - 89.

Notteboom, T. E. & Winkelmans, W. 2002, 'Stakeholder Relations Management in Ports: Dealing with the Interplay of Forces among Stakeholders in a Changing Competitive Environment'*, Proceedings of the International Association of Maritime Economists (IAME) 2002*, Panama City.

NSW Auditor-General 2011, *NSW Auditor-General's Report*, http://www.audit.nsw.gov.au/ArticleDocuments/228/06_Volume_Eight_2011_Maritime_Authority_NSW.pdf.aspx?Embed=Y, accessed 22 April 2012.

NTC 2006, *Twice the Task: A review of Australia's freight transport tasks*, National Transport Commission, Melbourne, Australia.

O'Connor, B. 2010, 'Speech of the Hon Minister for Home Affairs', *Pacific 2010 International Maritime Exposition, 28 January,*

OECD 2002, 'Impact of Transport Infrastructure Investment on Regional Development', in *Report of the Working Group on 'Effects of Transport Infrastructure Investment on Regional Development'*, The Organisation for Economic Co-operation and Development (OECD), Paris.

OECD 2011a, *Regional Development*, Directorate for Public Governance and Territorial Development, The Organisation for Economic Co-operation and Development (OECD), http://www.oecd.org/document/62/0,3343,en_2649_34413_36878654_1_1_1_1,00.html, accessed 02 February 2011.

OECD 2011b, *Regional Development Policies in OECD Countries*, Directorate for Public Governance and Territorial Development, The Organisation for Economic Co-operation and Development (OECD), http://www.oecd.org/document/6/0,3746,en_2649_34413_46231942_1_1_1_1,00.html, accessed 02 February 2011.

OECD 2013, *Rural-Urban Partnerships: An Integrated Approach to Economic Development*, Directorate for Public Governance and Territorial Development, The Organisation for Economic Co-operation and Development (OECD), http://www.oecd.org/gov/regional-policy/rural-urban-partnerships-an-integrated-approach-to-economic-development.htm, accessed 14 November 2013.

Olfert, M. R., Berdegué, J., Escobal, J., Jara, B. & Modrego, F. 2011, 'Places for Place-Based Policies', in *Documento de Trabajo*, Programa Dinámicas Territoriales Rurales, Santiago, Chile.

Olivier, D. & Slack, B. 2006, 'Rethinking the port', *Environment and Planning A,* vol. 38, no. 8, pp. 1409-1427.

Olsen, W. 2005, 'Triangulation in Social Research: Qualitative and Quantitative Methods Can Really Be Mixed', in *Developments in Sociology,* ed. M. Holborn, Causeway Press, Edinburgh.

Onwuegbuzie, A. J., Bustamante, R. M. & Nelson, J. A. 2010, 'Mixed Research as a Tool for Developing Quantitative Instruments', *Journal of Mixed Methods Research,* vol. 4, no. 1, pp. 56-78.

Onwuegbuzie, A. J. & Collins, K. M. T. 2007, 'A typology of mixed methods sampling designs in social science research ', *The Qualitative Report,* vol. 12, no. 2, pp. 281-316.

Onwuegbuzie, A. J. & Leech, N. L. 2006, 'Linking research questions to mixed methods data analysis procedures', *The Qualitative Report,* vol. 11, no. 3, pp. 474-498.

Onwuegbuzie, A. J. & Teddlie, C. 2003, 'A framework for analyzing data in mixed methods research', in *Handbook of Mixed Methods in Social & Behavioral Research,* eds. A. Tashakkori & C. Teddlie, SAGE Publications, Thousand Oaks, CA, pp. 351-383.

Paixao, A. C. & Marlow, P. B. 2003, 'Fourth generation ports--a question of agility?', *International Journal of Physical Distribution & Logistics Management,* vol. 33, no. 4, p. 355.

Pallant, J. 2011, *SPSS Survival Manual*, 4th edn, Allen & Unwin, New South Wales, Australia.

Pallis, A. A., Vitsounis, T. K. & De Langen, P. W. 2009, 'Port Economics, Policy and Management: Review of an Emerging Research Field', *Transport Reviews: A Transnational Transdisciplinary Journal,* vol. 30, no. 1, pp. 115 - 161.

Pallis, T. A. 2013a, 'The Diary of a successful event', in *The Port Executive Seminar 9 - 10 September 2013*, Antwerp, Belgium.

Pallis, T. A. 2013b, 'PortEconomics members co-sharing thought-provoking Scheldt Conference 2013', *PortEconomics*, http://www.porteconomics.eu/news/members-news/item/450-porteconomics-members-co-sharing-thought-provoking-scheldt-conference-2013.html, accessed 15 Oct 2013.

Panayides, P. M. & Song, D.-W. 2009, 'Port integration in global supply chains: measures and implications for maritime logistics', *International Journal of Logistics: Research & Applications,* vol. 12, no. 2, pp. 133-145.

Patton, M. 1990, *Qualitative evaluation and research methods*, Sage, Beverly Hills, CA.

Pekkarinen, S. & Harmaakorpi, V. 2006, 'Building regional innovation networks: The definition of an age business core process in a regional innovation system', *Regional Studies,* vol. 40, no. 4, pp. 401-413.

Perkins, G. H. 2004, 'Will Libraries' Web-based Survey Methods Replace Existing Non-Electronic Survey Methods?', *Information Technology and Libraries,* vol. 23, no. 3, pp. 123-126.

Pettit, S. J. & Beresford, A. K. C. 2009, 'Port development: from gateways to logistics hubs', *Maritime Policy & Management: The flagship journal of international shipping and port research,* vol. 36, no. 3, pp. 253 - 267.

Plano Clark, V. L., Garrett, A. L. & Leslie-Pelecky, D. L. 2010, 'Applying Three Strategies for Integrating Quantitative and Qualitative Databases in a Mixed Methods Study of a Nontraditional Graduate Education Program', *Field Methods,* vol. 22, no. 2, pp. 154-174.

Port Directory 2013, *Port Directory BETA: Port A-Z*, Maritime Information Services Ltd., http://www.port-directory.com/ports/gove/, accessed 11 December 2013.

Porter, M. E. 1990, *The Competitive Advantage of Nations*, Free Press, New York.

Porter, M. E. 2003, 'The Economic Performance of Regions', *Regional Studies,* vol. 37, no. 6/7, pp. 549-578.

Ports Australia 2011, *Ports Australia - Submission on reforming Australian shipping - A discussion paper for stakeholder consultation*, Ports Australia, https://www.infrastructure.gov.au/maritime/shipping_reform/files/Ports_Australia.pdf, accessed 05 March 2012.

Ports Australia 2013a, *Leading Practice: Port Master Planning*, Ports Australia, http://portsaustralia.com.au/port-master-planning.pdf, accessed 05 September 2013.

Ports Australia 2013b, *Ports Australia Website*, Ports Australia, http://www.portsaustralia.com.au/, accessed 10 Jan 2012.

Ports Australia 2014, *Trade Statistics*, Ports Australia, http://www.portsaustralia.com.au/tradestats/, accessed 02 April 2014.

Pratte, S. 2012, *Transportation Infrastructure and Regional Development in Northern Manitoba: Realities and Prospects,* M.A. thesis, University of Manitoba (Canada), Ann Arbor.

Prestowitz, C. V. 1994, 'The Fight over Competitiveness: A Zero-Sum Debate?', *Foreign Affairs-July/August,* vol. 73, no. 4, pp. 186-189.

PRIF 2013, *Pacific region infrastructure facility*, http://www.theprif.org/node/18, accessed 27 November 2013.

Punch, K. F. 2006, *Developing effective research proposals*, 2nd edn, Sage, London.

Pyvis, J. 2011, 'A Dynamic Approach to Western Australian Ports', *Murdoch University*, http://patrec.org/forum/2011/papers/4%20PYVIS%20Paper-JustinPyvis-DynamicApproach.pdf, accessed 08 May 2012.

QSR International 2012, *NVivo*, QSR International Pty Ltd, http://www.qsrinternational.com/, accessed 21 Feb 2012.

Raagmaa, G. 2002, 'Regional Identity in Regional Development and Planning1', *European Planning Studies,* vol. 10, no. 1, pp. 55 - 76.

Radcliff, R. 2012, *Is Economic Development A Zero Sum Game?*, Juggernaut, http://www.rdgfundraising.com/blog/is-economic-development-a-zero-sum-game/, accessed 26 March 2014.

Rangwala, K. 2010, 'place-based economy', *Economic Development Journal,* vol. 9, no. 1, pp. 42-47.

RDA 2013, *Regional Development Australia: An Australian Government Initiative*, Department of Regional Australia, Local Government, Arts and Sport, Australian Government, http://rda.gov.au/, accessed 15 July 2013.

Resnik, D. B. 2011, *What is ethics in research & why is it important?*, The National Institute of Environmental Health Sciences (NIEHS), The U.S. Department of Health and Human Services, http://www.niehs.nih.gov/research/resources/bioethics/whatis/, accessed 14 December 2011.

Reynolds, G. 2011, 'Planning for the future: Development priorities for ports'*, Proceedings of the Regional Ports Conference 2011 (presentation slides)*, Launceston, Tasmania.

Rietveld, P. 1989, 'Infrastructure and Regional Development- A Survey of Multiregional Economic-Models', *Annals of Regional Science,* vol. 23, no. 4, pp. 255-274.

Rietveld, P. 1994, 'Spatial economic impacts of transport infrastructure supply', *Transportation Research Part A: Policy and Practice,* vol. 28, no. 4, pp. 329-341.

Rip, A. 2002, 'Regional Innovation Systems and the Advent of Strategic Science', *Journal of Technology Transfer,* vol. 27, no. 1, pp. 123-131.

Roberts, B. H. & Enright, M. J. 2004, 'Industry clusters in Australia: recent trends and prospects', *European Planning Studies,* vol. 12, no. 1, pp. 99 - 121.

Roberts, P., Priest, H. & Traynor, M. 2006, 'Reliability and validity in research', *Nursing Standard,* vol. 20, no. 44, pp. 41-45.

Robinson, R. 2002, 'Ports as elements in value-driven chain systems: the new paradigm', *Maritime Policy & Management: The flagship journal of international shipping and port research,* vol. 29, no. 3, pp. 241-255.

Rodrigue, J.-P., Comtois, C. & Slack, B. 2013, *The Geography of Transport Systems*, Routledge, http://people.hofstra.edu/geotrans/eng/ch5en/conc5en/supplychainsaddedvalue.html, accessed 13 February 2013.

Rodrigue, J.-P. & Notteboom, T. 2006, *Challenges in the Maritime-Land Interface: Port Hinterlands and Regionalization*, Hofstra University, http://people.hofstra.edu/Jean-paul_Rodrigue/downloads/TN_JPR_KRIHS_Paper%202.pdf, accessed 12 August 2011.

Rodrigue, J.-P. & Notteboom, T. 2010, *Foreland-Based Regionalization: Integrating Intermediate Hubs with Port Hinterlands*, Hofstra University, http://people.hofstra.edu/Jean-paul_Rodrigue/downloads/Foreland-based%20regionalization_IFSPA-final.pdf, accessed 12 August 2011.

Rodrigue, J.-P., Notteboom, T. & Pallis, A. A. 2010, 'The Financialization of the Terminal and Port Industry: Rediscovering Risk'*, Proceedings of the 2010 Annual Conference of the International Association of Maritime Economists*, Lisbon, Portugal.

Rodrigue, J. P. 2003, 'The Port Authority of New York and New Jersy: Global Changes Regional Gains and Local Challenges in Port Development', in *Les Cahiers Scientifiques du Transport*, February 2004 edn.

Rodrigue, J. P., Comtois, C. & Slack, B. 2009, *The Geography of Transport Systems*, Routledge, http://people.hofstra.edu/geotrans/index.html, accessed 28 September 2010.

Rodríguez-Pose, A. 2013, 'Do Institutions Matter for Regional Development?', *Regional Studies,* vol. 47, no. 7, pp. 1034-1047.

Ron, M. & Sunley, P. 1996, 'Paul Krugman's Geographical Economics and Its Implications for Regional Development Theory: A Critical Assessment', *Economic Geography,* vol. 72, no. 3, pp. 259-292.

Rovai, A. P., Baker, J. D. & Ponton, M. K. 2013, *Social Science Research Design and Statistics*, Watertree Press, Cesapeake.

Roy, A. & Berger, P. D. 2004, 'Email and mixed mode database surveys revisited: Exploratory analyses of factors affecting response rates', *Journal of Database Marketing & Customer Strategy Management,* vol. 12, no. 2, pp. 153-171.

Rudestam, K. E. & Newton, R. R. 2001, *Surviving your dissertation: A comprehensive guide to content and process*, 2nd edn, SAGE Publications.

Sakalayen, Q. M., Chen, S.-L. & Cahoon, S. 2013, 'The Strategic Role of Australian Regional Ports in Regional Development: An Exploration of Port Stakeholders' Perceptions', *Proceedings of the International Association of Maritime Economists (IAME)*. Marseille, pp.

Salant, P. & Dillman, D. A. 1994, *How to conduct your own survey*, John Wiley & Sons, New York.

Saleh, M. A. 2006, *Antecedents of commitment to an import supplier,* PhD Thesis thesis, Queensland University of Technology, Brisbane, Queensland.

Salmi, P., Blomqvist, K., Ahola, J. & Kyläheiko, K. 2001, 'Industrial districts and regional development: Towards a knowledge-based view', in *Working paper 7*, Telecom Business Research Center, Lappeenranta University of Technology, Lappeenranta, Finland.

Salt, B. 2012, *The five tribes that shape our modern nation*, The Australian, http://www.theaustralian.com.au/help/contactus, accessed 31 March 2014.

Sanchez, R. J. & Wilmsmeier, G. 2007, 'The river plate basin - A comparison of port devolution processes on the east coast of South America', in *Devolution, Port Governance and Port Performance,* ed. M. Dresner, Elsevier, Oxford, UK.

Sandelowski, M. 2003, 'A framework for analyzing data in mixed methods research', in *Handbook of Mixed Methods in Social & Behavioral Research,* eds. A. Tashakkori & C. Teddlie, SAGE Publications, Thousand Oaks, CA, pp. 321-350.

Saunders, M., Lewis, P. & Thornhill, A. 2009, *Research methods for business students*, 5th edn, Pearson Education Limited, London.

Scandura, T. A. & Williams, E. A. 2000, 'Research methodology in management: Current practices, trends, and implications for future research', *Academy of Management Journal,* vol. 43, no. 6, pp. 1248-1264.

Schmitt-Egner, P. 2002, 'The Concept of 'Region': Theoretical and Methodological Notes on its Reconstruction', *Journal of European Integration,* vol. 24, no. 3, pp. 179-200.

Schreiber, J. B., Nora, A., Stage, F. K., Barlow, E. A. & King, J. 2006, 'Reporting Structural Equation Modeling and Confirmatory Factor Analysis Results: A Review', *The Journal of Educational Research,* vol. 99, no. 6, pp. 323-338.

Scott, D. 2005, 'Inter-organisational collaboration in family-centred practice: A framework for analysis and action', *Australian Social Work,* vol. 58, no. 2, pp. 132-141.

SCR 2012, *Port-centric supply chains the future*, SupplyChainReview, http://www.supplychainreview.com.au/news/articleid/81648.aspx, accessed 01 Jan 2013.

Seidman, L. S. 2012, 'Keynesian Fiscal Stimulus: What Have We Learned from the Great Recession?', *Business Economics,* vol. 47, no. 4, pp. 273-284.

Selm, M. & Jankowski, N. 2006, 'Conducting Online Surveys', *Quality and Quantity,* vol. 40, no. 3, pp. 435-456.

Shahhosseini, A., Kavousy, E. & Safariyan, A. 2009, 'Studying the relation of organizational entrepreneurship & financial functions at Tehran customs', *European Journal of Social Sciences,* vol. 12, no. 1, pp. 100-116.

Shaw, P. W. R. & Lloyd, M. G. 2000, 'Regional Development Agencies in England: New Strategic Regional Planning Issues?', *Regional Studies,* vol. 34, no. 1, pp. 75 - 79.

Sheppard, D. 2013, 'Recycling of Infrastructure Assets Needed to Improve Supply Chain Efficiency', in *Media Release, Australian Logistics Council*, Canberra, Australia.

Simsek, Z. & Veiga, J. F. 2001, 'A Primer on Internet Organizational Surveys', *Organizational Research Methods,* vol. 4, no. 3, pp. 218-235.

Sinclair, M. 2007, 'Editorial: A guide to understanding theoretical and conceptual frameworks', *Evidence Based Midwifery,* vol. 5, no. 2, p. 39.

Sipikal, M., PisÃ¡r, P. & UramovÃ¡, M. r. 2010, 'Support of Innovation at Regional Level', *E+M Ekonomie a Management*, no. 4, pp. 74-85.

SKM 2010, *Economic and Social Value of Victoria's Local Ports*, Sinclair Knight Merz,

http://www.rdv.vic.gov.au/__data/assets/pdf_file/0005/67856/Local-Ports-evaluation.pdf, accessed 13 march 2012.

Slack, B. & Wang, J. 2002, 'The challenge of peripheral ports: an Asian perspective', *GeoJournal,* vol. 56, no. 2, pp. 159-166.

Sober, E. 1999, 'The Multiple Realizability Argument against Reductionism', *Philosophy of Science,* vol. 66, no. 4, pp. 542-564.

Song, D.-W. 2003, 'Port co-opetition in concept and practice', *Maritime Policy & Management,* vol. 30, no. 1, pp. 29-44.

Sorensen, T. 2000, 'Regional Development: Some Issues for Policy Makers', in *Research Paper No. 26 1999-2000*, Parliamentary Library, Commonwealth of Australia, Canberra.

Sorensen, T., Marshall, N. & Dollery, B. 2007, 'Changing Governance of Australian Regional Development: Systems and Effectiveness', *Space and Polity,* vol. 11, no. 3, pp. 297 - 315.

Sotarauta, M. 2005, 'Shared Leadership and Dynamic Capabilities in Regional Development', in *Regionalism Contested: Institution, Society and Governance. Urban and Regional Planning and Development Series,* eds. Sagan & Halkier*,* Ashgate, Cornwall, pp. 53-72.

State Government of Victoria 2012, *Ports & freight*, Department of Transport, http://www.transport.vic.gov.au/freight/ports/about-victorian-ports, accessed 22 April 2012.

State of Victoria 2009, *Port Futures: New priorities and directions for Victoria's ports system*, Department of Transport, Melbourne.

State of Victoria 2009b, 'Towards an integrated and sustainable transport future', in *A new legislative framework for transport in Victoria*, Melbourne.

Steenkamp, J.-B. E. M., Batra, R. & Alden, D. L. 2003, 'How Perceived Brand Globalness Creates Brand Value', *Journal of International Business Studies,* vol. 34, no. 1, pp. 53-65.

Sternberg, R. 2000, 'Innovation networks and regional development--evidence from the European Regional Innovation Survey (ERIS): Theoretical concepts, methodological approach, empirical basis', *European Planning Studies,* vol. 8, no. 4, p. 389.

Stilwell, F. 1992, *Understanding Cities and Regions*, Pluto Press, Sydney.

Storey, R. 2013, 'Port Botany and Port Kembla lease finalised'*, Media Release*,

http://www.sydneyports.com.au/__data/assets/pdf_file/0006/29139/151Q2711.pdf, accessed 20 June 2013.

StudyMode 2013, *Pacific region infrastructure facility*, http://www.studymode.com/essays/The-Infrastructure-Is-Important-To-The-132698.html, accessed 27 November 2013.

Sue, V. M. & Ritter, L. A. 2007, *Conducting Online Surveys*, Sage, Thousand Oaks.

Suhr, D. D. 2006, 'Exploratory or Confirmatory Factor Analysis?', *Proceedings of the SUGI 31*, San Francisco.

SurveyMonkey 2012, 'Smart Survey Design', p. 35, http://s3.amazonaws.com/SurveyMonkeyFiles/SmartSurvey.pdf, accessed 4 June 2013.

SurveyMonkey 2013, *Plans and Pricing*, SurveyMonkey.com, http://www.surveymonkey.com/pricing/upgrade/details/?, accessed 04 March 2013.

Suykens, F. & Van De Voorde, E. 1998, 'A quarter a century of port management in Europe: objectives and tools', *Maritime Policy & Management: The flagship journal of international shipping and port research,* vol. 25, no. 3, pp. 251-261.

Sydney Ports 2013a, *About Us*, Sydney Ports Corporation, http://www.sydneyports.com.au/corporation/About_Us, accessed 10 December 2013.

Sydney Ports 2013b, *Port Facilities*, Sydney Ports Corporation, http://www.sydneyports.com.au/corporation/port_facilities, accessed 10 December 2013.

Symonds, J. E. & Gorard, S. 2010, 'The death of mixed methods? Or the rebirth of researcg as a craft ', *Evaluation & Research in Education,* vol. 23, no. 2, pp. 121-136.

Syrett, S. & Silva, C. N. 2001, 'Regional Development Agencies in Portugal: Recent Development and Future Challenges', *Regional Studies,* vol. 35, no. 2, pp. 174 - 180.

Szili, G. & Rofe, M. W. 2007, 'Greening Port Misery: Marketing the Green Face of Waterfront Redevelopment in Port Adelaide, South Australia', *Urban Policy and Research,* vol. 25, no. 3, pp. 363-384.

Tabachnick, B. G. & Fidell, L. S. 2007, *Using multivariate statistics*, Pearson Education, Boston, MA.

Tan, T.-Y. 2007, 'Port cities and hinterlands: A comparative study of Singapore and Calcutta', *Political Geography*, no. 26, pp. 851-865.

Tashakkori, A. & Creswell, J. W. 2007, 'Editorial: Exploring the Nature of Research Questions in Mixed Methods Research', *Journal of Mixed Methods Research,* vol. 1, no. 3, pp. 207-211.

Tashakkori, A. & Teddlie, C. (eds) 2003a, *Handbook of Mixed Methods in Social & Behavioral Research,* SAGE Publications, Thousand Oaks, CA.

Tashakkori, A. & Teddlie, C. 2003b, 'The past and future of mixed methods research: from data triangulation to mixed model designs', in *Handbook of Mixed Methods in Social & Behavioral Research,* eds. A. Tashakkori & C. Teddlie, SAGE Publications, Thousand Oaks, CA, pp. 671-701.

Tashakkori, A. & Teddlie, C. (eds) 2010, *Handbook of Mixed Methods in Social & Behavioral Research,* SAGE Publications, Thousand Oaks, CA.

TasPorts 2012, *Regional Ports*, http://www.tasports.com.au/about/outports.html, accessed 11 May 2012.

Teddlie, C. & Tashakkori, A. 2003, 'Major issues and controversies in the use of mixed methods in social and behavioral sciences', in *Handbook of Mixed Methods in Social & Behavioral Research,* eds. A. Tashakkori & C. Teddlie, SAGE Publications, Thousand Oaks, CA, pp. 3-50.

Teddlie, C. & Tashakkori, A. 2009, *Foundations of mixed methods research*, SAGE Publications, Thousand Oaks, CA.

The State of Queensland 2008, 'Review of Current Port Competition and Regulation in Queensland', in *Final Report December 2007*, Queensland Department of Transport, Brisbane.

The State of Queensland 2012, *Business and industry: Queensland ports*, The Department of Transport and Main Roads, http://www.tmr.qld.gov.au/Business-industry/Transport-sectors/Ports/Queensland-ports.aspx, accessed 25 April 2012.

Thomas, N. J., Harvey, D. C. & Hawkins, H. 2012, 'Crafting the Region: Creative Industries and Practices of Regional Space', *Regional Studies,* vol. 47, no. 1, pp. 75-88.

Thompson, B. & Daniel, L. G. 1996, 'Factor Analytic Evidence for the Construct Validity of Scores: A Historical Overview and Some

Guidelines', *Educational and Psychological Measurement,* vol. 56, no. 2, pp. 197-208.

Toh, K. K. T., Welsh, K. & Hassall, K. 2010, 'A Collaboration Service Model for a Global Port Cluster', *International Journal of Engineering Business Management,* vol. 2, no. 1, pp. 29-34.

Tomaney, J. 2010, 'Place-based approaches to regional development: Global trends and Australian implications', in *A report for the Australian Business Foundation*, Sydney, Australia.

Trond Åge, L., Johansen, F. R., Callisen, F., Normann, S. & Thoresen, J. 2005, 'Innovation and regional development', *AI & Society,* vol. 19, no. 4, pp. 384-406.

Tsheola, J. 2002, 'South Africa in GEAR: 'A better life for all' or a zero-sum game of globalization?', *GeoJournal,* vol. 57, pp. 15-28.

UNCTAD 1985, 'Port development', in *A handbook for planners in developing countries*, United Nations Publication, New York.

UNCTAD 1990, *Port Marketing and the Challenge of the 3rd Generation Port*, UNCTAD Secretariat, Geneva.

UNCTAD 1992a, 'Development and Improvement of Ports', in *The Principles of Modern Port Management and Organisation* United Nations Conference on Trade and Development (UNCTAD), Geneva.

UNCTAD 1992b, 'Report of the Committee on Shipping and Ad hoc Intergovernmental Group of Port Experts', in *Port Marketing and the Challenge of the Third Generation Port*, United Nations Conference on Trade and Development (UNCTAD), Geneva.

UNCTAD 1996, 'Potentialities for Regional Port Cooperation', in *Report by the United Nations Conference on Trade and Development (UNCTAD)*, United Nations Publication, New York, pp. 1-30.

UNCTAD 1999, 'Technical Note - The Fourth-Generation Port ', in *Ports Newsletter N 19*, United Nations Conference on Trade and Development (UNCTAD), Geneva.

UNCTAD 2008, 'Review of Maritime Transport', in *Report by UNCTAD Secretariat*, United Nations Conference on Trade and Development (UNCTAD), Geneva.

UNESCAP 2002, 'Commercial Development of Regional Ports as Logistics Centres', in *Study report by UN Economic and Social Commission for Asia and the Pacific (UNESCAP)*, United Nations, New York, pp. 1-109.

UNESCAP 2005, 'Regional Shipping and Port Development Strategies', in *Managing Globalization - a monograph series by UN Economic and Social Commission for Asia and the Pacific (UNESCAP)*, United Nations, New York, pp. 1-62.

UTAS 2011, *Research: Integrity and Ethichs*, The University of Tasmania, http://www.utas.edu.au/research/integrity-and-ethics, accessed 21 February 2011.

Van Der Lugt, L. & De Langen, P. W. 2007, 'Port authority strategy: Beyond the landlord- a conceptual approach', *Proceedings of the IAME 2007*, Athens.

Van Klink, H. A. & Van Den Berg, G. C. 1998, 'Gateways and intermodalism', *Journal of Transport Geography*, no. 9, pp. 267-278.

Van Teijlingen, E. R. & Hundley, V. 2001, *The importance of pilot studies*, University of Surrey, http://sru.soc.surrey.ac.uk/SRU35.pdf, accessed 11 September 2012.

Van Winden, W. & Van Klink, H. A. 1998, 'Towards a new hinterland orientation for Rotterdam: the entrepreneurial port', *Paper for the 38th congress of the European Regional Science Association*, pp. 1-16, http://www-sre.wu-wien.ac.at/ersa/ersaconfs/ersa98/papers/319.pdf, accessed 12 Oct 2013.

Verhoeff, J. M. 1981, 'Seaport competition: some fundamental and political aspects', *Maritime Policy & Management,* vol. 8, pp. 49-60.

Verhoeven, P. 2010, 'A review of port authority functions: towards a renaissance?', *Maritime Policy & Management: The flagship journal of international shipping and port research,* vol. 37, no. 3, pp. 247 - 270.

Verhoeven, P. 2011, 'European Port Governance', in *Report of an enquiry into the current governance of European seaports*, European Sea Ports Organisation (ESPO), Brussel.

Vleugels, R. L. M. 1969, 'The Economic Impact of Ports on the Regions They Serve and the Role of Industrial Development', *Proceedings of the 6th Biennial Conference of the International Association of Ports and Harbors*. Melbourne, Australia, pp. 1-13.

Wang, J. J. & Slack, B. 2004, 'Regional governance of port development in China: a case study of Shanghai International Shipping Center', *Maritime Policy & Management: The flagship journal of international shipping and port research,* vol. 31, no. 4, pp. 357 - 373.

Webb, G. 2010, ' Delivering growth: the importance of infrastructure for regional ports'*, Proceedings of the Regional Ports 2010 Conference (presentation slides)*, Darwin, Australia.

Wheelen, T. L. & Hunger, J. D. 2002, *Strategic Management and Business Policy*, eighth edition edn, Prentice Hall, New Jersey.

White, C. 2004, *Strategic Management*, Palgrave Macmillan, New York.

Williams, B., Brown, T. & Onsman, A. 2010, 'Exploratory factor analysis: A five-step guide for novices', *Australasian Journal of Paramedicine,* vol. 8, no. 3, pp. 1-13.

Wilmsmeier, G., Monios, J. & Lambert, B. 2010, 'Observations on the Regulation of 'Dry Ports' by National Governments'*, Proceedings of the 2010 Annual Conference of the International Association of Maritime Economists*, Lisbon, Portugal.

Winkelmans, W. & Notteboom, T. 2007, 'Port master planning: Balancing stakeholders' interests', in *The reality and dilemmas of globalization,* eds. K. Dobrowolski & J. Zurek, The Foundation of the Development of Gdansk University, Gdansk.

Wolfe, D. A. 2011, 'Regional Resilience and Place-based Development Policy: Implications for Canada', *Paper presented to the Annual Meeting of the Canadian Political Science Association*, http://www.cpsa-acsp.ca/papers-2011/Wolfe.pdf, accessed 24 October 2013.

Woo, S.-H., Bang, H.-S., Martin, S. & Li, K. X. 2013, 'Evolution of research themes in Maritime Policy & Management—1973–2012', *Maritime Policy & Management,* vol. 40, no. 3, pp. 200-225.

Woodhouse, A. 2006, 'Social capital and economic development in regional Australia: A case study', *Journal of Rural Studies,* vol. 22, no. 1, pp. 83-94.

Woolley, C. M. 2009, 'Meeting the Mixed Methods Challenge of Integration in a Sociological Study of Structure and Agency', *Journal of Mixed Methods Research,* vol. 3, no. 1, pp. 7-25.

World Bank 2008a, 'Alternative Port Management Structures and Ownership Models', in *Port Reform Toolkit,* The World Bank, Washington DC, USA.

World Bank 2008b, *World Bank Port Reform Tool Kit*, The World Bank, Washington DC, USA.

World Commission on Environment and Development 1987, *Our Common Future*, Oxford University Press, Oxford.

Yeung, H. W.-c. 2009, 'Regional Development and the Competitive Dynamics of Global Production Networks: An East Asian Perspective', *Regional Studies,* vol. 43, no. 3, pp. 325-351.

Yin, R. K. 2011, *Qualitative research from start to finish*, The Guilford Press, New York.

Young-Hyman, T. 2008, 'The Potential for Effective Regional Development Agencies in Turkey: A Comparative Analysis', *Regional & Federal Studies,* vol. 18, no. 4, pp. 375 - 402.

Zauner, A. 2008, 'Strategic Port Planning: A Case Study of the Rotterdam Seaport Cluster applying the SWOT Framework', http://www.springerlink.com/content/x60943p622613674/, accessed 26 September 2011.

Zhao, Y., Liu, P. & Yang, Z. 2007, 'Evolution of Regional Port System in Modern Logistics'*, Proceedings of the Automation and Logistics, 2007 IEEE International Conference on*, 18-21 Aug. 2007.

Zhaoliang, L., Xu, Z., ye-er, X. & Baoyi, Z. 2009, 'Study on the relationship between port cluster and regional economic development with SD', *2009 IEEE International Conference on Automation and Logistics (ICAL)*, pp. 1800-5.

Zikmund, W. G., Babin, B. J., Carr, J. C. & Griffin, M. 2010, *Business Research Methods*, 8th edn, South-Western Cengage Learning, Mason, USA.

Appendix A

APPENDICES

Social Science Ethics Officer
Private Bag 01 Hobart
Tasmania 7001 Australia
Tel: (03) 6226 2763
Fax: (03) 6226 7148
Katherine.Shaw@utas.edu.au

HUMAN RESEARCH ETHICS COMMITTEE (TASMANIA) NETWORK

UTAS

19 January 2012

Dr Peggy Chen
National Centre for Ports and Shipping
Locked Bag 1397
Launceston Tasmania

Student Researcher: Quazi Sakalayen

Dear Dr Chen

Re: MINIMAL RISK ETHICS APPLICATION APPROVAL
Ethics Ref: **H0012289 - The Strategic Role of Australian Regional Ports in Regional Development**

We are pleased to advise that acting on a mandate from the Tasmania Social Sciences HREC, the Chair of the committee considered and approved the above project on 19 January 2012.

Please note that this approval is for four years and is conditional upon receipt of an annual Progress Report. Ethics approval for this project will lapse if a Progress Report is not submitted.

The following conditions apply to this approval. Failure to abide by these conditions may result in suspension or discontinuation of approval.

1. It is the responsibility of the Chief Investigator to ensure that all investigators are aware of the terms of approval, to ensure the project is conducted as approved by the Ethics Committee, and to notify the Committee if any investigators are added to, or cease involvement with, the project.

2. Complaints: If any complaints are received or ethical issues arise during the course of the project, investigators should advise the Executive Officer of the Ethics Committee on 03 6226 7479 or human.ethics@utas.edu.au.

3. Incidents or adverse effects: Investigators should notify the Ethics Committee immediately of any serious or unexpected adverse effects on participants or unforeseen events affecting the ethical acceptability of the project.

Appendix A

4. Amendments to Project: Modifications to the project must not proceed until approval is obtained from the Ethics Committee. Please submit an Amendment Form (available on our website) to notify the Ethics Committee of the proposed modifications.

5. Annual Report: Continued approval for this project is dependent on the submission of a Progress Report by the anniversary date of your approval. You will be sent a courtesy reminder closer to this date. **Failure to submit a Progress Report will mean that ethics approval for this project will lapse.**

6. Final Report: A Final Report and a copy of any published material arising from the project, either in full or abstract, must be provided at the end of the project.

Yours sincerely

Katherine Shaw
Acting Executive Officer

Table B-1: State wise ports list depending on specific commodity handling

Name of States	Export commodities									
	Coal	Iron Ore	Steel	Grain	Sugar	Cotton	Wool	Livestock	Motor vehicle	Aluminium
WA	• Fremantle	• Port Hedland • Dampier • Esperance • Geraldton • Fremantle	• Port Hedland	• Fremantle • Geraldton • Albany • Esperance				• Fremantle • Broome • Geraldton • Port Hedland	• Fremantle	• Fremantle • Bunbury
SA			• Adelaide	• Adelaide • Port Lincoln • Wallaroo • Port Giles • Thevenard			• Adelaide	• Adelaide	• Adelaide	
VIC	• Melbourne		• Melbourne • Hastings • Geelong	• Melbourne • Geelong • Port Hedland	• Melbourne	• Melbourne	• Melbourne	• Portland • Melbourne	• Melbourne	• Geelong • Portland • Melbourne
NSW	• NSW port • Port Kembla • Sydney	• Sydney port	• Port Kembla • Sydney • Newcastle	• Newcastle • Sydney • Port Kembla	• Sydney • Yamba	• Sydney	• Sydney		• Port Kembla	• Sydney • Newcastle
QL	• Hay Point • Gladstone • Abbot Point • Brisbane		• Brisbane	• Brisbane • Mackay • Gladstone	• Townsville • Mackay • Lucinda • Mourilyan • Cairns • Bundaberg • Brisbane	• Brisbane • Gladstone	• Brisbane	• Weipa • Townsville • Karumba • Brisbane • Mourilyan	• Townsville • Brisbane • Gladstone	• Weipa • Gladstone • Brisbane
NT		• Darwin						• Darwin port	• Darwin	
TAS				• Burnie • Devonport				• Devonport • Burnie	• Devonport • Burnie	• Bell bay • Burnie • Devonport

Source: Ports Australia (2013b)

Table B-1: State wise ports list depending on specific commodity handling (continued)

Name of States	Export commodities									
	Timber	Zinc	Copper	Lead	Oil & Petroleum	Gas	Silica Sand	Mineral Sand	Manganese	Nickel
WA	• Bunbury • Albany •	• Geraldton	• Port Hedland • Geraldton • Bunbury	•	• Fremantle ● Port Hedland • Dampier ● Esperance • Geraldton ●Broome • Albany	• Dampier • Fremantle	• Bunbury • Albany	• Bunbury • Geraldton	• Port Hedland	• Esperance
SA	• Adelaide •	• Port Pirie • Adelaide	• Adelaide	• Adelaide	• Adelaide • Port Lincoln	•	•	• Adelaide • Thevenard	•	•
VIC	• Portland • Geelong • Melbourne •	• Melbourne	• Melbourne	• Melbourne	• Melbourne • Geelong • Newcastle • Hastings	• Hastings • Melbourne	•	• Portland	•	•
NSW	• Eden • Sydney • Yamba • Newcastle	• Sydney	• Kembla • Newcastle • Sydney	• Sydney	• Sydney • Newcastle • Kembla • Yamba	• Sydney • Yamba	• Newcastle • Sydney	• Sydney	• Newcastle • Sydney	• Sydney
QL	• Brisbane •	• Townsville • Karumba • Brisbane •	• Townsville • Brisbane	• Townsville • Karumba • Brisbane	• Brisbane ● Gladstone • Townsville ● Mackay • Cairns ● Weipa • Port Alma (Rockhampton) • Thursday Island	• Brisbane	• Cape Flattery • Brisbane	• Brisbane	• Gladstone • Brisbane	• Brisbane • Townsville
NT	• Darwin •	•	• Darwin •		• Darwin	•	•	•	• Darwin	•
TAS	• Hobart • Bell Bay • Burnie • Devonport	• Burnie • Hobart • Bell bay	• Burnie • Bell Bay	• Hobart • Burnie	• Hobart • Devonport • Burnie • Bell Bay	•	• Burnie	•	• Bell Bay • Burnie	•

Source: Ports Australia (2013b)

Appendix B

Table B-2: Throughputs of major Australian ports

Port	Total throughput (in thousand mass tonnes)				
	2011/12	2010/11	2009/10	2008/09	2007/08
New South Wales					
Eden (Sydney Ports)	591	1,228	1,128	1,199	1,273
Newcastle Port Corporation	129,283	114,575	103,027	95,840	93,315
Port Kembla Port Corporation	27,821	29,978	27,176	24,394	26,591
Sydney Ports Corporation	30,069	29,732	28,161	27,754	29,177
Yamba (Sydney Ports)	2	5	8	16	16
Victoria					
Geelong Port (Patrick)	12,499	11,817	8,981	9,611	10,755
Melbourne Port Corporation	35,877	32,328	30,293	29,102	30,822
Port of Hastings (Patrick)	2,079	2,322	2,544	2,654	2,842
Port of Portland	5,387	3,983	2,965	2,880	3,253
Queensland					
Abbot Point (NQBP)	13,602	15,064	16,934	14,443	12,476
Cairns (Ports North)	1,030	1,025	1,106	1,086	1,197
Cape Flattery (Ports North)	1,777	2,026	1,730	1,483	1,735
Gladstone (Gladstone Ports)	83,790	76,405	83,365	79,149	76,480
Port Rockhampton (Gladstone Ports)	421	324	278	228	168
Hay Point (NQBP)	82,854	87,805	99,465	82,450	80,430
Karumba	980	957	643	1,010	1,073
Lucinda (Townsville)	13	421	592	599	575
Mackay (NQBP)	2,713	2,552	2,548	2,405	2,476
Mourilyan (Ports North)	453	508	519	649	527
Port of Brisbane Pty Ltd	37,211	33,246	32,079	31,895	30215
Bundaberg (Gladstone Ports)	260	313	201	-	-
Quintell Beach (Ports North)	2	1	2	2	4
Thursday Island (Ports North)	102	73	62	81	78
Townsville (Townsville)	12,885	10,601	10,253	9,085	9,834
Weipa (NQBP)	25,092	22,323	20,676	-	22,111
South Australia					
Klein Point	1,929	1,560	1,559	1,426	1,910
Port Adelaide (Flinders)	15,670	12,720	10,600	9,720	10,297
Port Giles	1,014	880	324	327	331
Port Lincoln (Flinders)	2,998	2,933	1,308	1,435	1,076
Port Pirie (Flinders)	652	550	652	712	569
Thevenard (Flinders)	2,828	3,032	2,151	2,000	2,059
Wallaroo (Flinders)	953	910	410	587	316
Western Australia					
Albany Port Authority	3,456	3,069	3,420	4,169	3,666
Broome Port Authority	209	177	148	176	321
Bunbury Port Authority	14,274	13,998	13,867	13,277	13,659
Dampier Port Authority	171,844	165,025	170,732	140,824	133,949
Esperance Ports	11,751	11,120	11,267	9,955	9,934
Fremantle Ports	28,212	20,245	20,450	20,536	26,084
Geraldton Port Authority	10,427	10,004	8,989	7,656	6,709
Port Hedland Port Authority	246,672	199,002	178,625	159,391	130,707
Tasmania					
Bell Bay (TasPorts)	2,333	4,034	3,785	4,703	5,513
Burnie (TasPorts)	3,744	3,980	4,102	4,166	4,457
Devonport (TasPorts)	3,357	3,203	3,057	3,193	3,264
Hobart (TasPorts)	1,780	2,321	2,271	2,791	2,992
Northern Territory					
Darwin Port Corporation	3,511	3,730	4,578	3,775	2,730
Total	**1,034,406**	**942,105**	**917,030**	**808,831**	**797,969**

Source: Ports Australia (2014)

Table B-3: Modal shares of Australian domestic freight

(In million tonnes)

Year / Mode	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Road (Bulk)	444.6	499.2	465.9	508.8	526.8	553.2	643.8	na	na	na
Road (Non-bulk)	1037.4	1164.8	1087.1	1187.2	1229.2	1290.8	1502.2	na	na	na
Road (Total)	1482.0	1664.0	1553.0	1696.0	1756.0	1844.0	2146.0	na	na	na
Rail (Bulk)	na	na	na	na	na	na	na	641.7	na	na
Rail (Non-bulk)	na	na	na	na	na	na	na	15.9	na	na
Rail (Total)	na	na	575.7	590.9	634.3	641.2	665.6	657.6	na	na
Coastal shipping (Bulk) [only loading]	45.3	46.1	45.7	45.5	45.9	48.6	49.3	51.2	44.6	na
Coastal shipping (Non-bulk) [only loading]	6.7	6.3	7.1	7.7	7.7	6.7	7.1	8.3	7.0	na
Coastal shipping (Total) [only loading]	52.0	52.4	52.8	53.2	53.6	55.3	**56.4**	59.5	51.6	na
Air (Bulk)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Air (Non-bulk)	na	na	na	na	na	0.3	0.3	0.3	0.2	0.2
Air (Total)						0.3	0.3	0.3	0.2	0.2
Grand Total	-	-	2181.50	2340.10	2443.90	2540.80	**2868.30**	-	-	-

[na → not available, n/a → not applicable]

Data source: Australian Infrastructure Statistics Yearbook 2011 (BITRE 2011a); Australian Transport Statistics Yearbook 2009 (BITRE 2009c)

Table B-4: Modal shares of total Australian domestic freight task

(In billion tonne-kilometres)

Financial Year / Mode	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Road	139.4 (36.6%)	146.2 (35.9%)	151.2 (35.7%)	157.0 (35.5%)	166.5 (35.9%)	173.3 (35.8%)	182.2 (35.9%)	190.8 (37.2%)	na	na
Rail	136.9 (36.0%)	150.5 (37%)	158.1 (37.3%)	168.1 (38.0%)	183.0 (39.5%)	189.0 (39.0%)	198.7 (39.2%)	197.6 (38.5%)	na	na
Coastal shipping	104.5 (27.4%)	110.4 (27.1%)	114.8 (27.1%)	117.0 (26.5%)	114.0 (24.6%)	122.0 (25.2%)	**126.2 (24.9%)**	124.5 (24.3%)	107.4	na
Total	380.80	407.10	424.10	442.10	463.50	484.30	**507.10**	512.90	-	na

[na → not available]

Data source: Australian Infrastructure Statistics Yearbook 2011(BITRE 2011a)

Table B-5: Share of international sea-freight by State/Territory (on the basis of origin and destination)

(In million tonnes)

Year / State	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
NSW	105.38 (19.2%)	107.15 (19.0%)	106.23 (18.0%)	112.75 (18.1%)	116.81 (17.2%)	121.23 (17.4%)	122.48 (16.7%)	131.43 (16.6%)	132.99 (15.9%)	142.29 (15.0%)
VIC	28.5 (5.2%)	29.62 (5.2%)	26.67 (4.5%)	29.32 (4.7%)	29.59 (4.3%)	29.02 (4.2%)	28.08 (3.8%)	29.62 (3.8%)	27.76 (3.3%)	29.2 (3.1%)
QL	153.92 (28.0%)	158.87 (28.1%)	166.01 (28.1%)	172.21 (27.7%)	185.37 (27.2%)	185.03 (26.6%)	195.05 (26.6%)	198.93 (25.2%)	204.89 (24.5%)	229.93 (24.3%)
SA	13.21 (2.4%)	15.44 (2.7%)	12.51 (2.1%)	11.84 (1.9%)	11.78 (1.7%)	13.22 (1.9%)	11.74 (1.6%)	13.58 (1.7%)	15.54 (1.9%)	17.17 (1.8%)
WA	226.11 (41.1%)	231.1 (40.9%)	260.09 (44.0%)	277.56 (44.6%)	317.74 (46.7%)	327.86 (47.1%)	350.16 (47.7%)	388.05 (49.1%)	423 (50.7%)	498.21 (52.6%)
TAS	7.87 (1.4%)	7.98 (1.4%)	8.56 (1.4%)	8.36 (1.3%)	8.29 (1.2%)	7.46 (1.1%)	7.55 (1.0%)	8.45 (1.1%)	7.48 (0.9%)	7.12 (0.8%)
NT	12.91 (2.3%)	10.45 (1.9%)	9.52 (1.6%)	8.43 (1.4%)	9.0 (1.3%)	10.15 (1.5%)	16.41 (2.2%)	16.84 (2.1%)	19.07 (2.3%)	20.58 (2.2%)
Others	2.21 (0.4%)	4.03 (0.7%)	1.98 (0.3%)	2.01 (0.3%)	2.02 (0.3%)	1.99 (0.3%)	2.26 (0.3%)	2.74 (0.3%)	4.07 (0.5%)	3.09 (0.3%)
Total	550.11	564.64	591.57	622.48	680.6	695.96	733.73	789.64	834.8	947.59

Data source: Various issues of statistical report on Australian sea-freight (BITRE 2008a, 2009a, 2010a, 2011b; BTRE 2003a, 2003b, 2005, 2006a, 2007a, 2007b)

Table B-6: Share of coastal shipping in domestic freight task- by State/Territory

(In billion tonne kilometres)

Year / State	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
NSW	7.4	5.2	5.7	4.9	5.3	5.3	6.2	6.0	3.0	na
VIC	9.4	6.6	7.6	6.6	6.6	9.0	9.1	8.0	6.2	na
QL	30.7	30.9	31.7	33.7	37.1	41.2	42.0	43.0	42.0	na
SA	9.2	9.6	10.1	8.2	8.5	8.9	9.3	10.5	9.3	na
WA	41.8	49.9	51.8	55.5	48.4	50.8	55.1	51.8	40.3	na
TAS	2.9	5.7	5.8	5.5	4.6	4.4	4.3	4.4	3.9	na
NT	3.1	2.4	2.3	2.5	3.5	2.4	0	0	2.8	na
ACT	na	na	na	na	na	na	na	na	na	na
Total	104.5	110.4	114.8	117.0	114.0	122.0	125.0	124.0	107.4	na

Data source: Australian Infrastructure Statistics Yearbook 2011 (BITRE 2011a)

Appendix C

Telephone Interview questionnaires:

Questions for Australian Regional Port Officials (that is, internal port stakeholders)

1. Please describe the relation of your port with the region in which it is embedded? Which activities that your port undertakes have contributed to the region and regional development?

2. Should regional ports maintain and / or enhance community relations to help build trust and networks among regional businesses and entities (i.e. social capital)?

3. Is your port involved in government's regional development programmes?

4. What are the factors/drivers essential for regional development in your region?

5. What are the problems/bottlenecks that your port encounters in day-to-day operations and management? Is there any regional opportunities and constraints that may impact on your port development?

6. Does your port consider regional strengths and constraints when developing strategic planning? Has your port adopted a stakeholder management approach for strategic planning? How?

7. Do regional ports participate in regional businesses through joint or multi-stakeholders initiatives? How?

8. Is your port engaged in information generation, collection and sharing about the region and its interacting issues? Is it possible for a regional port to be involved in such activities?

9. How can a port become better engaged in generating innovative ideas in regional innovation systems?

10. Can a regional port be a network leader in regional innovation systems to construct regional competitive advantages?

Appendix C

Questions for external (or other) port stakeholders

1. What activities does the port in your region undertake that contribute to the region and regional development? Are there any limitations of the ports in your region to contributing to regional development?

2. Should regional ports maintain and / or enhance community relations to help building trust and networks among regional businesses and entities (i.e. social capital)?

3. What are the factors/drivers essential for the regional development in your region?

4. Has the port in your region adopted a stakeholder management approach for strategic planning? Should regional ports take its regional strengths and constraints into consideration when framing its strategic planning?

5. Can regional ports participate in regional businesses through joint or multi-stakeholders initiatives? How?

6. Is the port in your region engaged in information generation, collection and sharing about the region? How?

7. How can a regional port be better engaged in generating innovative ideas in a regional innovation system?

8. Can a regional port be a network leader in a regional innovation system to construct regional competitive advantages?

Appendix C

Four summary short questions (Yes/No) asked at the end of each telephone interview are:

Q1. Do you think Australian regional ports contribute in regional development? _____ Y / N

Q2. Do you think that a port can play a leading role for regional innovation in which it is embedded? _____ Y / N

Q3. Do you think that the port in your region maintains sufficient societal and community relations? _____ Y / N

Q4. Do you think that there is a necessity for ports to be involved in regional development and regional innovation system? _____ Y/ N

Appendix C

Table C-1: Telephone interview participants' responses on four short questions

Interview participant code	Q1*	Q2*	Q3*	Q4*
TIP 01	Y	Y	Y	Y
TIP 02	Y	Y	N	Y
TIP 03	Y	Y	N	Y
TIP 04	Y	Y	Y	N
TIP 05	Y	Y	Y	Y
TIP 06	Y	Y	Y	Y
TIP 07	Y	Y	Y	Y
TIP 08	N	Y	N	Y
TIP 09	Y	Y	Y	Y
TIP 10	Y	Y	N	Y
TIP 11	Y	N	Y	Y
TIP 12	Y	Y	Y	Y
TIP 13	Y	Y	N	Y
TIP 14	Y	Y	Y	Y
TIP 15	Y	Y	Y	Y
TIP 16	Y	Y	Y	Y
TIP 17	Y	Y	N	Y
TIP 18	Y	Y	Y	Y
TIP 19	Y	Y	Y	Y
TIP 20	Y	Y	N	Y
TIP 21	Y	Y	Y	Y
TIP 22	Y	Y	Y	Y
TIP 23	Y	N	Y	Y
TIP 24	Y	Y	Y	Y
TIP 25	Y	Y	Y	Y
TIP 26	Y	Y	N	Y
TIP 27	Y	NS	N	Y
TIP 28	Y	N	Y	Y
TIP 29	Y	Y	N	Y
TIP 30	Y	NS	Y	Y
TIP 31	Y	Y	Y	Y
TIP 32	Y	Y	N	Y
TIP 33	Y	Y	NS	Y
TIP 34	Y	Y	Y	N
TIP 35	Y	N	Y	Y
TIP 36	Y	Y	Y	Y
TIP 37	Y	Y	Y	Y
TIP 38	Y	Y	N	Y
Total	**Y=37 N=1**	**Y=32, N=4, & Not Sure=2**	**Y=25, N=12 & Not Sure=1**	**Y=36, N=2**

*Please see previous leaf for short summary questions

Appendix D

Table D-1: Various sampling methods for web-based or online survey

Author	Types of online samples	
Bethlehem and Biffignandi (2012)	**Probability based:** Simple random sampling Stratified sampling Cluster sampling Unequal probability sampling	
Fricker (2008)	**Probability based:** a list-based sampling frame non-list-based random sampling Intercept (pop-up) Mixed-mode with Internet-based option Pre-recruited panel	**Non-probability:** Entertainment polls Unrestricted self-selected harvested e-mail lists (and data) volunteer (opt-in) panels
Sue and Ritter (2007)	**Probability based:** *For closed populations:* Simple random Systematic Stratified Cluster *For open populations:* Intercept Pre-recruited panel	**Non-probability:** Convenience Volunteer opt-in panel Snowball
Couper (2000)	**Probability based:** Intercept surveys List-based samples for high coverage Mixed-mode designs Pre-recruited panels of Internet users	**Non-probability:** Entertainment surveys Self-selected Web surveys Volunteer panels of Internet users volunteer (opt-in) panels

Appendix D

Table D-2: Preconceptions about Internet methods

Preconception	Finding
1) Internet samples are not demographically diverse	***Mixed.*** Internet samples are more diverse than traditional samples in many domains (e.g., gender), though they are not completely representative of the population
2) Internet samples are maladjusted, socially isolated, or depressed	***Myth.*** Internet users do not differ from non-users on markers of adjustment and depression.
3) Internet data do not generalize across presentation formats	***Myth.*** Internet findings replicated across two presentation formats. The presentation format did not significantly affect the nature or quality of the results.
4) Internet participants are unmotivated	***Myth.*** Internet methods provide means for motivating participants (e.g., feedback).
5) Internet data are compromised by anonymity of participants	***Fact.*** However, Internet researchers can take steps to eliminate repeat responders.
6) Internet-based findings differ from those obtained with other methods	***Myth?*** Evidence so far suggests that Internet-based findings are consistent with findings based on traditional methods (e.g., on self-esteem, personality), but more data are needed.

Source: Gosling et al. (2004, p.95)

Table D-3: Major Internet sources for generating sampling frame

Stratum	Internet sources	Information on Organisations/ Associations/ Councils
Port officials	http://www.portsaustralia.com.au/	Ports Australia is the peak representative body for Australian ports and marine authorities
	The Websites of some Australian ports- (Links for names of the ports): http://www.portsaustralia.com.au/misc/Ports%20Australia%20map.pdf	In Australia there are 70 ports of which 65 regional ports. Some of the ports have their own Websites.
Port policy and planning contributors	http://www.infrastructure.gov.au/	Federal- Department of Infrastructure and Transport
	http://www.directory.gov.au/	Federal- Australian Government Directory
	http://australia.gov.au/topics/government-and-parliament/prime-minister-and-ministry/government-ministry	Federal- Government ministry
	http://www.regional.gov.au/	Federal- Department of Regional Australia, Local Government, Arts and Sport
	http://rda.gov.au/	Federal- Regional Development Australia (RDA) is an Australian government initiative to bring together all levels of government to enhance regional development. It is a national network of 55 committees. Each committee is made up of local leaders, all levels of government, business and community groups.
	http://alga.asn.au/	Australian Local Government Association
	http://www.lgma.org.au/	Local Government managers Australia
	http://www.ausmepa.org.au/	Australian Marine Environment Protection Association
	http://www.gbrmpa.gov.au/	Great barrier Reef Marine Park Authority
	http://www.dsdip.qld.gov.au/	Queensland Government- Department of State Development, Infrastructure and Planning
	http://www.dier.tas.gov.au/	Tasmania Government- Department of Infrastructure, Energy & Resources
	http://www.development.tas.gov.au/	Tasmania Government- Department of Economic Development, Tourism and the Arts
	http://www.rdl.wa.gov.au/Pages/default.aspx	Western Australia Government- Department of Regional Development and Lands
	http://dlg.wa.gov.au/	Western Australia Government- Department of Local Government
	http://www.transport.vic.gov.au/	Victoria Government- Department of Transport
	http://www.dpti.sa.gov.au/	South Australia Government- Department of Planning, Transport and Infrastructure
	http://www.transport.nt.gov.au/	Northern Territory Government- Department of Transport
	http://www.nt.gov.au/infrastructure/	Northern Territory Government- Department of Infrastructure
	http://www.dob.nt.gov.au/Pages/default.aspx	Northern Territory Government- Department of Business
	http://www.directory.nsw.gov.au/index.asp	New South Wales government- Directory

Table D-3: Major Internet sources for generating sampling frame (continued)

Stratum	Internet sources	Information on Organisations/ Associations/ Councils
	http://www.planning.nsw.gov.au/	New South Wales Government- Planning & Infrastructure
	http://www.business.nsw.gov.au/	New South Wales Government- Trade & Investment
Port users	http://shippingaustralia.com.au/	The 'Shipping Australia Limited' is a peak industry body to promote and advance the interests of shipowners and shipping agents. They have 35 full members out of a total of 83 associates
	http://www.asa.com.au/	Australian Shipowners Association represents shipowners and employers of maritime labours. They have a total of 25 members
	http://austlogistics.com.au/	Australian Logistics Council
	http://www.laa.asn.au/	Logistics Association of Australia Limited
	http://www.sclaa.com.au/	Supply Chain & Logistics Association of Australia
	http://www.qtlc.com.au/australian-freight-councils/	Australian Freight Councils Network
	http://www.bca.com.au/	Business council of Australia
	http://www.acci.asn.au/	Australian Chamber of Commerce and Industry
	http://www.cciwa.com/	Chamber of Commerce and Industry WA
	http://www.nswbusinesschamber.com.au/Home	NSW Business Chamber
	http://www.cciq.com.au/	Chamber of Commerce and Industry QLD
	http://www.vecci.org.au/	Victorian Employers Chamber of Commerce and Industry
	http://business-sa.com/	Chamber of Commerce and Industry SA
	http://www.chambernt.com.au/	Chamber of Commerce and Industry NT
	http://www.actchamber.com.au/	ACT & Region Chamber of Commerce and Industry
	http://www.tcci.com.au/home	Chamber of Commerce and Industry TAS
	http://www.export.org.au/eca/homepage	Export council of Australia
	http://www.afif.asn.au/	Australian Federation of International Forwarders
	http://www.ftalliance.com.au/	Freight and Trade Alliance

Concept: Adapted from Chen, Effler and Roche (2001)

Appendix E

Table E-1: Profile analysis of the telephone interview participants

		No. of participant	% of total 38 interviews	Average interview duration within the group (in mins)	% of total 1513 mins interview time
Port Official (PO)	***Designation:***				
	Chief Executive Officer (CEO) / Acting CEO	12	32	39	31
	General Manager (GM) / Finance Manager (FM)	5	13	38	13
	Harbour Master (HM) / Port Manager / Pilot	3	8	50	10
	Experience:				
	5 years or less	6	16	41	16
	Within a range of 6 to 10 years	4	11	41	11
	Over 10 years	10	26	40	26
	State / Territory:				
	Western Australia (WA)	3	8	43	9
	South Australia (SA)	1	3	31	2
	Victoria (VIC)	3	8	36	7
	New South Wales (NSW)	4	11	38	10
	Queensland (QLD)	6	16	43	17
	Northern Territory (NT)	2	5	35	5
	Tasmania (TAS)	1	3	56	4
	Australian Capital Territory (ACT)	0	0	0	0
	Sub – total PO	**20**	**53**	**40**	**53**
External/other Port Stakeholders (PS)	***Designation:***				
	Infrastructure Coordinator (IC) / Chief Executive Officer (CEO) / Ex- CEO	7	18	44	20
	Executive Director (ED) / General Manager (GM) / President- Local Chamber of Commerce	5	13	38	12
	Operations Manager (OM) / Business Development Manager (BDM) / Manager / Executive Officer (EO)	6	16	36	14
	Experience:				
	5 years or less	3	8	28	6
	Within a range of 6 to 10 years	5	13	40	13
	Over 10 years	10	26	43	28
	State / Territory:				
	Western Australia (WA)	3	8	46	9
	South Australia (SA)	1	3	39	3
	Victoria (VIC)	1	3	33	2
	New South Wales (NSW)	3	8	36	7
	Queensland (QLD)	0	0	0	0
	Northern Territory (NT)	0	0	0	0
	Tasmania (TAS)	6	16	37	15
	Australian Capital Territory (ACT)	4	11	43	11
	Sub – total PS	**18**	**47**	**39**	**47**

Table F-1: Summary on theme building

Codes	General themes	Composite themes and major themes
C1. Community consultation **C2.** Sponsorships or activities for community, society, environment, and business **C3.** Corporate social responsibility of port **C4.** Planning for common interest **C5.** RD catalyst **C6.** RD stakeholder **C7.** Information sharing for regional initiatives **C8.** Accountability to community **C9.** Community engagement for innovation **C10.** Port as trust (social capital) building platform	**GT1.** Regular information sharing for community consultation (→CT3, CT6, CT7, CT15) **GT2.** Port as a regional platform (→CT1, CT4, CT11) **GT3.** Planning for mutual interests in region (→CT1, CT11)	**Composite themes:** **CT1.** Long term plan, planning capability and regional planning consistency **CT2.** Business viability & Financial performance **CT3.** Enhance/nurture environmental responsibilities of port **CT4.** Enhancing social capital **CT5.** Balanced involvement of public-private partnership
C11. Interfacing platform for regional competitive advantages **C12.** Network point for the regional business **C13.** Critical conduit for the organisational cooperation **C14.** Port-city integration strategy	**GT4.** Regional organisational cooperation (→CT4, CT11) **GT5.** Network conduit for regional businesses (→CT6, CT12) **GT6.** Regional strategic infrastructure to enhance regional competitive advantages (→CT1, CT12)	**CT6.** Exchanging information as network conduit **CT7.** Joint efforts for supply chain efficiency **CT8.** Sharing resources for collaboration
C15. Gateway for export-import **C16.** Economic strategist **C17.** Economic enabler for business **C18.** Knowledge hub for regional economy **C19.** Business incubation per year **C20.** Business catalyst	**GT7.** Regional economic enabler (→CT2, CT12) **GT8.** Regional gateway (→CT6, CT7, CT12) **GT9.** Regional business catalyst (→CT4, CT11, CT15)	**CT9.** Policy support for collaborative activities and enhance public-private partnership

(PTO)

Codes	General themes	Composite themes and major themes
C21. Port as objective stakeholder (i.e. interested in the efficiency of complete supply chains) **C22.** Stakeholder management **C23.** Partnership for supply chain coordination **C24.** Entrepreneurship in joint stakeholder initiatives **C25.** Regional collaboration for supply chain integration	**GT10.** Supply chain focused collaboration with regional organisation (→CT5, CT8, CT12, CT14) **GT11.** Demand based objective stakeholder (→CT1, CT7, CT12) **GT12.** Regional organisational entrepreneurship and innovation (→CT7, CT9, CT13) **GT13.** Fixing indicators for ports involvement in RD (→CT3, CT4, CT12, CT13)	**CT10.** Proactive leadership and innovation **CT11.** Participatory platform for RIS **CT12.** Working for regional competitive advantage and capacity enhancement **CT13.** Entrepreneurship for regional innovation with risk taking attitude **CT14.** Participation in regional resources configuration **CT15.** Opening port as an interactive learning platform
C26. Risk taking attitude for opportunity creation **C27.** Opportunity capture for port **C28.** Procurement from the region **C29.** Region induced strategy	**GT14.** Promotion of port-city oriented procurement (→CT4, CT12) **GT15.** Opportunity capture and creation (→CT6, CT8, CT10, CT13, CT14)	
C30. Port activity for transport efficiency and environment **C31.** Lack of demand modelling **C32.** Flexibility of approval system **C33.** Fixation of building blocks **C34.** Planning capability **C35.** Lack of policy support **C36.** System improvement for RD	**GT16.** Nurturing environment and community in port activities (→CT3, CT4, CT7) **GT17.** Planning capability and policy support (→CT1, CT2, CT9)	**Major Themes** **MT1.** Port sustainability (CT1-CT5)
C37. Lack of financial authority **C38.** Lack of leadership **C39.** Poor financial condition of regional ports **C40.** A participatory leadership in the region for RIS	**GT18.** Necessity of solid financial ground (→CT2, CT5, CT10)	**MT2.** Building Collaborative advantage (CT6-CT9) **MT3.** Port's active participation in RIS (CT10-CT15)

(PTO)

Codes	General themes	Composite themes and major themes
C41. Balanced public – private partnership **C42.** Flexible operating environment **C43.** Increase private sector participation	**GT19.** Optimal involvement of public and private partnership in port sector (→CT5, CT7, CT10, CT15)	
C44. Participation in innovative regional resource configuration **C45.** Indicators for ports' involvement in various dimensions of RD **C46.** Systemic engagement for regional innovation **C47.** Regional platform for RIS **C48.** Common interest for innovation **C49.** Holistic perspective for RIS **C50.** Customer interaction for innovation	**GT20.** Requirement of a formal RIS in regions (→CT6, CT14, CT15) **GT21.** A participatory leadership of port in regional network for RIS (→CT8, CT10, CT11, CT14)	

* '→' indicates contribution towards

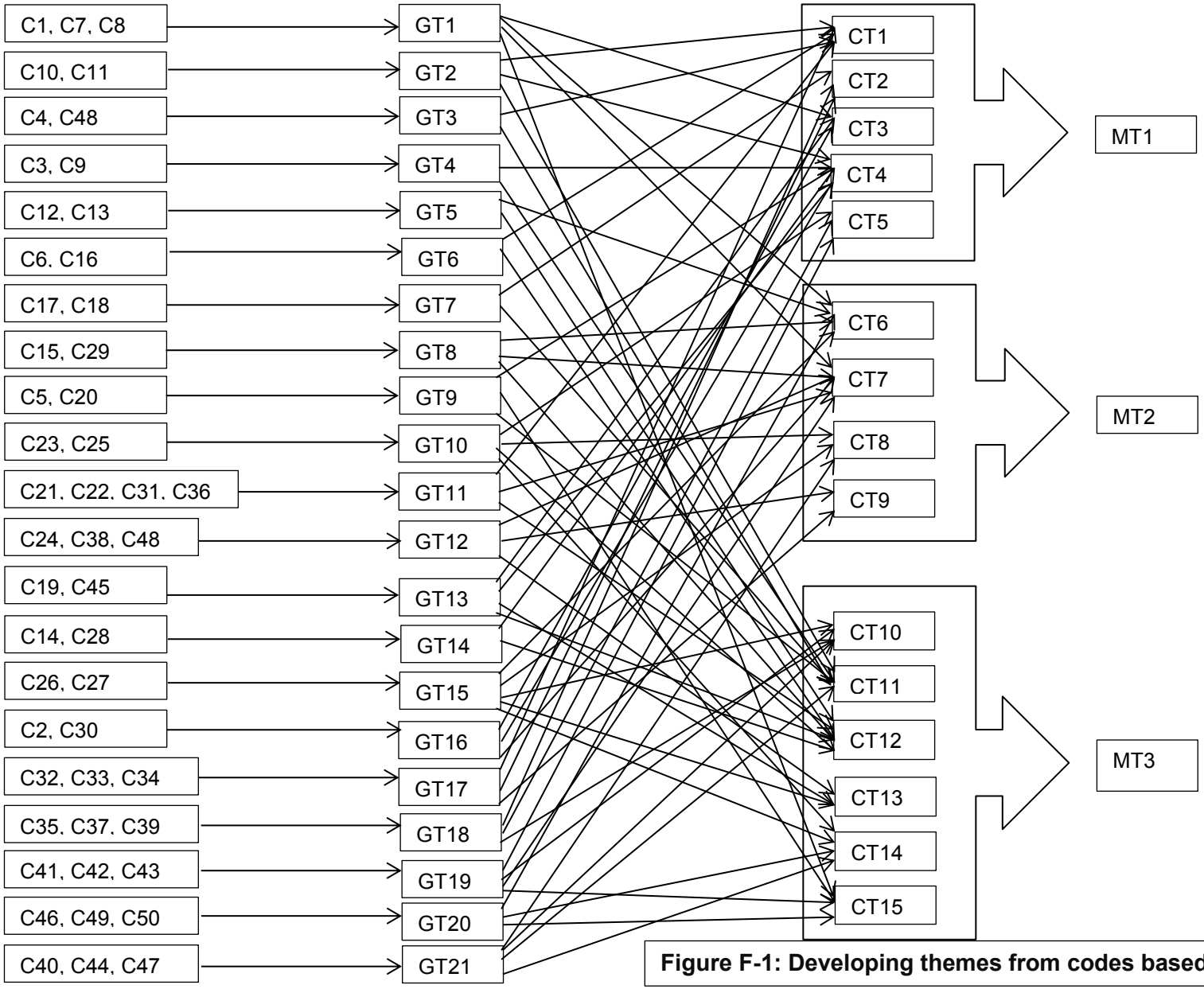


Figure F-1: Developing themes from codes based on interview

Table F-2: Code occurrence (frequency) matrix across the nodes

Codes		Nodes				
		N1 (Port-region relation)	N2 (Regional development and port)	N3 (Port's current issues)	N4 (Port's pro-activeness)	N5 (Port's participation in RIS)
Code frequency across nodes	**C1**	3	0	2	1	1
	C2	2	2	0	0	0
	C3	2	2	0	0	0
	C4	2	1	0	1	1
	C5	1	0	0	0	0
	C6	0	1	0	0	0
	C7	0	1	3	2	1
	C8	2	0	3	0	0
	C9	0	0	2	0	2
	C10	0	3	0	2	0
	C11	2	3	0	0	2
	C12	0	0	0	0	2
	C13	2	1	0	0	1
	C14	0	1	1	0	0
	C15	3	2	0	0	0
	C16	0	1	0	0	2
	C17	2	2	0	0	0
	C18	0	2	0	0	1
	C19	0	0	0	2	2
	C20	2	0	0	2	0
	C21	1	0	0	2	0
	C22	0	0	2	1	0
	C23	2	2	1	1	1
	C24	0	2	0	4	2
	C25	2	2	1	2	3
	C26	0	2	1	2	2
	C27	1	1	0	2	0
	C28	0	0	0	1	0
	C29	0	2	0	0	0
	C30	0	2	2	0	1

Table F-2: Code occurrence (frequency) matrix across the nodes (continued)

Codes		Nodes				
		N1 (Port-region relation)	N2 (Regional development and port)	N3 (Port's current issues)	N4 (Port's pro-activeness)	N5 (Port's participation in RIS)
Code frequency across nodes	**C31**	0	0	1	2	0
	C32	0	0	2	0	0
	C33	0	2	3	0	2
	C34	1	2	1	0	0
	C35	0	1	1	2	0
	C36	0	0	1	0	0
	C37	1	0	1	2	0
	C38	0	0	1	3	0
	C39	1	0	3	0	0
	C40	0	0	1	3	2
	C41	0	2	2	0	3
	C42	0	0	2	0	0
	C43	1	0	0	0	2
	C44	0	1	0	0	3
	C45	0	3	0	0	0
	C46	0	0	0	0	3
	C47	1	0	0	0	2
	C48	1	0	0	3	3
	C49	0	0	0	3	3
	C50	0	1	0	2	2

Table F-3: Interview participants by codes

Interview participant code	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13
TIP 01	✓						✓					✓	
TIP 02	✓			✓			✓	✓					✓
TIP 03													
TIP 04			✓		✓					✓	✓		
TIP 05			✓				✓	✓					
TIP 06	✓												
TIP 07				✓						✓	✓		
TIP 08								✓		✓			
TIP 09			✓				✓						
TIP 10				✓							✓		
TIP 11		✓											
TIP 12							✓						
TIP 13						✓							✓
TIP 14									✓				
TIP 15									✓				
TIP 16											✓		
TIP 17				✓					✓				
TIP 18											✓	✓	
TIP 19													
TIP 20	✓												
TIP 21			✓										
TIP 22													
TIP 23													✓
TIP 24				✓									
TIP 25	✓									✓			
TIP 26	✓												
TIP 27								✓					
TIP 28													
TIP 29								✓					
TIP 30							✓						
TIP 31											✓		
TIP 32									✓				
TIP 33										✓			
TIP 34		✓					✓						
TIP 35		✓											
TIP 36	✓												
TIP 37											✓		
TIP 38		✓											✓

(PTO)

Table F-3: Interview participants by codes (continued)

	C14	C15	C16	C17	C18	C19	C20	C21	C22	C23	C24	C25	C26
TIP 01				✓					✓	✓	✓		
TIP 02		✓	✓		✓				✓	✓	✓		
TIP 03		✓										✓	✓
TIP 04		✓		✓						✓	✓	✓	
TIP 05											✓	✓	
TIP 06	✓						✓						
TIP 07												✓	
TIP 08					✓			✓					
TIP 09	✓												
TIP 10		✓											
TIP 11				✓									
TIP 12										✓			
TIP 13			✓		✓			✓					
TIP 14													✓
TIP 15													✓
TIP 16								✓					
TIP 17							✓						✓
TIP 18				✓							✓		
TIP 19													✓
TIP 20												✓	
TIP 21			✓										
TIP 22		✓											
TIP 23										✓			
TIP 24													
TIP 25												✓	
TIP 26							✓						✓
TIP 27													✓
TIP 28						✓				✓		✓	
TIP 29													
TIP 30											✓	✓	
TIP 31												✓	
TIP 32						✓							
TIP 33													
TIP 34							✓			✓			
TIP 35									✓				
TIP 36						✓							
TIP 37													
TIP 38						✓						✓	

(PTO)

Table F-3: Interview participants by codes (continued)

	C27	C28	C29	C30	C31	C32	C33	C34	C35	C36	C37	C38	C39
TIP 01							✓						
TIP 02				✓					✓				
TIP 03							✓						
TIP 04						✓					✓		✓
TIP 05	✓	✓											
TIP 06				✓									
TIP 07									✓		✓		✓
TIP 08							✓	✓			✓	✓	✓
TIP 09	✓												
TIP 10							✓						
TIP 11				✓	✓								
TIP 12													
TIP 13			✓				✓	✓				✓	
TIP 14													
TIP 15												✓	
TIP 16							✓						
TIP 17													
TIP 18													
TIP 19						✓							
TIP 20											✓		✓
TIP 21													
TIP 22				✓					✓				
TIP 23				✓									
TIP 24													
TIP 25												✓	
TIP 26													
TIP 27													
TIP 28													
TIP 29													
TIP 30													
TIP 31													
TIP 32								✓					
TIP 33													
TIP 34			✓										
TIP 35					✓		✓	✓		✓			
TIP 36	✓												
TIP 37	✓												
TIP 38					✓				✓				

(PTO)

Table F-3: Interview participants by codes (continued)

	C40	C41	C42	C43	C44	C45	C46	C47	C48	C49	C50
TIP 01					✓			✓			
TIP 02	✓	✓		✓	✓			✓	✓	✓	
TIP 03									✓		
TIP 04	✓										
TIP 05		✓							✓		
TIP 06		✓				✓			✓		✓
TIP 07					✓						
TIP 08			✓	✓			✓				
TIP 09					✓					✓	
TIP 10								✓			
TIP 11		✓								✓	✓
TIP 12											
TIP 13			✓				✓				
TIP 14									✓		
TIP 15	✓										
TIP 16						✓					
TIP 17						✓					
TIP 18											
TIP 19		✓									
TIP 20											
TIP 21	✓										
TIP 22	✓										✓
TIP 23									✓		
TIP 24	✓										
TIP 25				✓			✓				
TIP 26											
TIP 27											
TIP 28		✓									
TIP 29											
TIP 30											
TIP 31										✓	
TIP 32											
TIP 33										✓	
TIP 34											
TIP 35											✓
TIP 36											
TIP 37											
TIP 38		✓							✓	✓	✓

Table F-4: Aggregated code similarity matrix

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C 18	C19	C20	C21	C22	C23	C24	C25
C1	-																								
C2	-	-																							
C3	-	1	-																						
C4	-	-	-	-																					
C5	-	-	-	-	-																				
C6	-	-	-	-	-	-																			
C7	2	-	-	-	-	-	-																		
C8	2	-	-	-	-	-	3	-																	
C9	1	-	9	-	-	-	-	-	-																
C10	-	-	-	-	-	-	-	-	-	-															
C11	-	-	-	-	-	-	-	-	-	2	-														
C12	-	-	-	-	-	-	-	-	-	-	-	-													
C13	-	-	-	-	-	-	1	-	-	-	-	1	-												
C14	-	-	-	-	-	-	-	-	-	-	-	-	-	-											
C15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
C16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-									
C17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
C18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-							
C19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
C20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
C21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
C22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-			
C23	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	1	-	-		
C24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	
C25	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	1	-	-	-	-	-	1	-	-

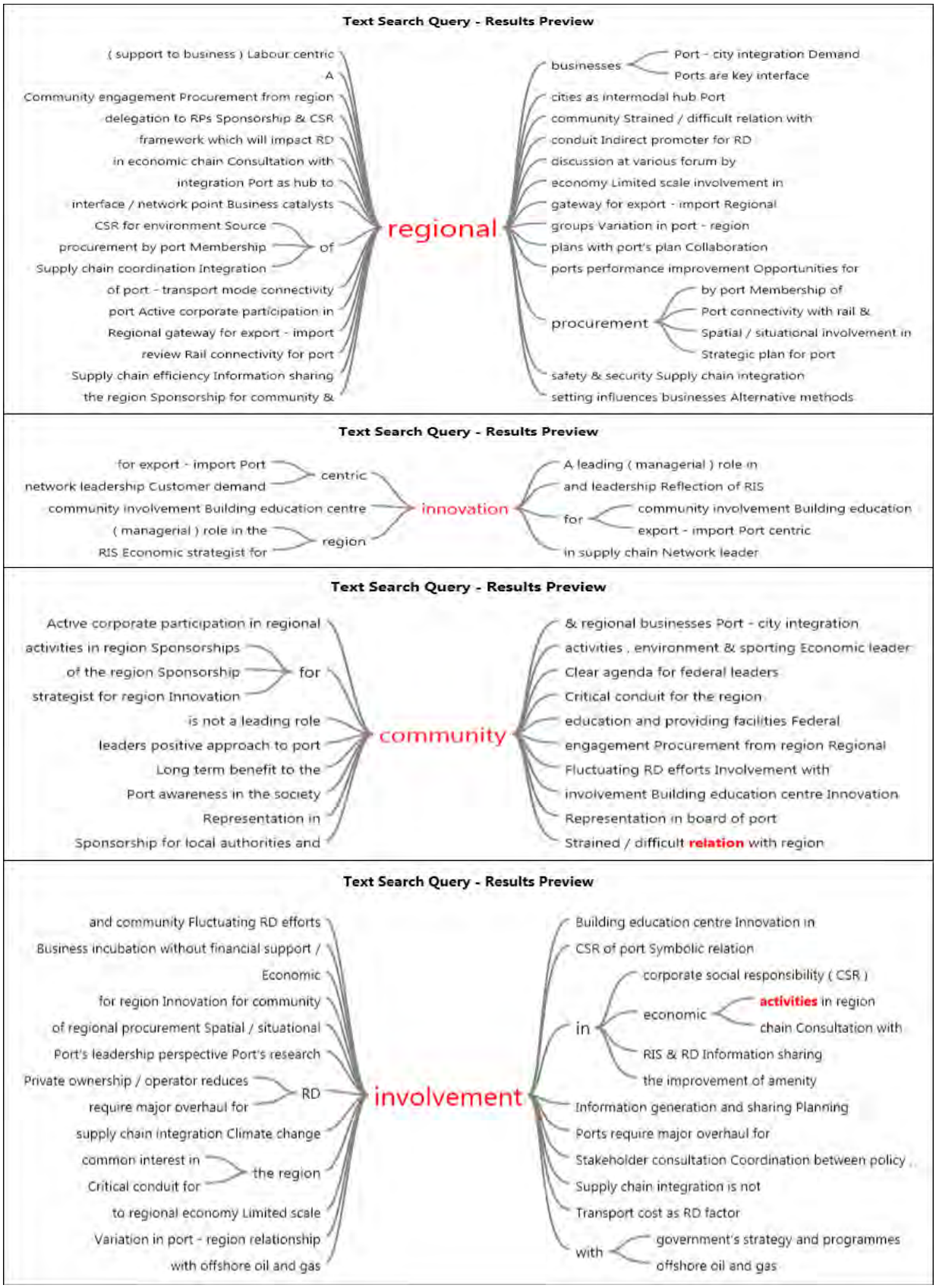
Table F-4: Aggregated code similarity matrix (continued)

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C 18	C19	C20	C21	C22	C23	C24	C25
C26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
C28	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
C29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-
C30	-	2	-	-	-	-	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C31	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1
C37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C38	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	2	-
C39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C40	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	2
C41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C43	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C44	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	2
C45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
C46	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C47	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	1
C48	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	2	1	-
C49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
C50	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1

Table F-4: Aggregated code similarity matrix (continued)

	C26	C27	C28	C29	C30	C31	C32	C33	C34	C35	C36	C37	C38	C39	C40	C41	C42	C43	C44	C45	C46	C47	C48	C49	C50
C26	-																								
C27	1	-																							
C28	-	-	-																						
C29	-	1	-	-																					
C30	-	-	-	1	-																				
C31	-	-	-	-	-	-																			
C32	-	-	-	-	-	-	-																		
C33	-	-	-	-	-	-	-	-																	
C34	-	-	-	-	-	-	1	1	-																
C35	-	-	-	-	2	-	-	-	1	-															
C36	-	-	-	-	-	1	-	-	-	-	-														
C37	-	-	-	-	-	-	-	-	-	1	-	-													
C38	-	-	-	-	-	-	-	-	-	-	-	-	-												
C39	-	-	-	-	-	-	-	-	-	1	-	1	-	-											
C40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
C41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-									
C42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-								
C43	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	3	1	-							
C44	2	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-						
C45	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
C46	-	-	-	-	-	-	-	1	-	-	-	-	-	-	2	-	-	-	-	-	-				
C47	1	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	2	-	-	-			
C48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
C49	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	
C50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-

Table F-5: Some 'text query' results (outputs of N Vivo)



Appendix G

Locked Bag 1397
Launceston Tasmania 7250 Australia
Phone + 61 3 6324 9831
Email: quazis@amc.edu.au

CONFIDENTIAL

2013 The Strategic Role of Australian Regional Ports in Regional Development

- ✓ This survey is the ***2nd phase of the study*** on 'The Strategic Role of Australian Regional Ports in Regional Development'. This study has been approved by the Tasmanian Social Science Human Research Ethics Committee (HREC). The ethics reference number is H0012289.
- ✓ The ***purpose of this survey*** is to examine strategies for Australian regional ports involvement in regional development.
- ✓ All information collected through this study will be treated confidentially. ***Please be assured that all responses will only be used for research purposes with confidentiality and will not be attributed to any individual's names.*** Receiving your completed questionnaire implies your consent to participate in this survey.
- ✓ The survey will take ***about 20 minutes*** of your time to complete.
- ✓ If you have further questions, please do not hesitate to contact Mr Quazi Sakalayen by email quazis@amc.edu.au or telephone 03 6324 9831.

This questionnaire contains 6 sections from A - F

Please start here ↓

A. The relationship between Australian regional ports and their host regions

A1. To what extent do you agree or disagree with the following descriptions of an Australian regional port?

		Strongly agree 5	Agree 4	Neither agree nor disagree 3	Disagree 2	Strongly disagree 1	Don't know 0
A1.1	An Australian regional port is a **port outside metropolitan cities** serving regional businesses	☐5	☐4	☐3	☐2	☐1	☐0
A1.2	An Australian regional port is a **non-capital city port** to help regional businesses	☐5	☐4	☐3	☐2	☐1	☐0
A1.3	An Australian regional port is a port that assists regional primary producers, importers, exporters and/or serves mining sector for their smooth operation	☐5	☐4	☐3	☐2	☐1	☐0
A1.4	A uniform definition of an Australian regional port is not essential as each port has a different geographical setting	☐5	☐4	☐3	☐2	☐1	☐0
A1.5	Other opinion *(please specify)* _____						

_____

A2. Please indicate the 'quality of links' of the regional port in your region with the following?

		Excellent 5	Good 4	Average 3	Poor 2	Very poor 1	Don't know 0
A2.1	Road network	☐5	☐4	☐3	☐2	☐1	☐0
A2.2	Rail network	☐5	☐4	☐3	☐2	☐1	☐0
A2.3	Coastal shipping	☐5	☐4	☐3	☐2	☐1	☐0
A2.4	International shipping	☐5	☐4	☐3	☐2	☐1	☐0
A2.5	Air transport access	☐5	☐4	☐3	☐2	☐1	☐0

A3. To what extent do you agree or disagree with the following statements about the regional port in your region?

		Strongly agree 5	Agree 4	Neither agree nor disagree 3	Disagree 2	Strongly disagree 1	Don't know 0
A3.1	A **facilitator** of trade and transport	☐5	☐4	☐3	☐2	☐1	☐0
A3.2	An **economic strategist** as it participates in regional economic policy and planning initiatives in the region	☐5	☐4	☐3	☐2	☐1	☐0
A3.3	A **gateway** in a system consisting of supply chains, logistics, trade, and transport networks	☐5	☐4	☐3	☐2	☐1	☐0
A3.4	An **objective stakeholder** as it has an interest in overall efficiency of supply chains rather than only on the parts of supply chains that exist in port premises	☐5	☐4	☐3	☐2	☐1	☐0
A3.5	A **hub for regional economy** for its pivotal position for cargo movements and related activities	☐5	☐4	☐3	☐2	☐1	☐0
A3.6	A **community manager** by coordinating regional stakeholders to achieve collective targets	☐5	☐4	☐3	☐2	☐1	☐0

A4. How important are the following to the regional port in your region?

		Extremely important 5	Very important 4	Moderately important 3	Slightly important 2	Not at all important 1	Don't know 0
A4.1	The port **pursues commercial objectives** that have positive impact on regional development	☐5	☐4	☐3	☐2	☐1	☐0
A4.2	The port **engages in business opportunities** for the region	☐5	☐4	☐3	☐2	☐1	☐0
A4.3	The port **requires more autonomy** for better involvement in regional development	☐5	☐4	☐3	☐2	☐1	☐0
A4.4	The port **delivers specialised skills** enhancing competence of the region and in turn improves the standard of living	☐5	☐4	☐3	☐2	☐1	☐0

B. Port sustainability

Port sustainability refers to business strategies and activities that provide a balance between the current and future requirements of the port and its stakeholders, i.e. to pursue economic prosperity, environmental quality and social responsibility.

B1. How important are the following to your regional port's sustainability?

		Extremely important 5	Very important 4	Moderately important 3	Slightly important 2	Not at all important 1	Don't know 0
B1.1	A long term plan	☐5	☐4	☐3	☐2	☐1	☐0
B1.2	In-house planning capability	☐5	☐4	☐3	☐2	☐1	☐0
B1.3	Port's financial viability	☐5	☐4	☐3	☐2	☐1	☐0
B1.4	Nurturing environment	☐5	☐4	☐3	☐2	☐1	☐0
B1.5	Enhancement of social networks with regional stakeholders	☐5	☐4	☐3	☐2	☐1	☐0
B1.6	Strengthening the relationships with cities and towns	☐5	☐4	☐3	☐2	☐1	☐0
B1.7	Access to funding for port development	☐5	☐4	☐3	☐2	☐1	☐0
B1.8	Publishing annual environmental report indicating trends in port's environmental management performance	☐5	☐4	☐3	☐2	☐1	☐0
B1.9	Public ownership of the port	☐5	☐4	☐3	☐2	☐1	☐0
B1.10	Allowing increased private sector participation in ports	☐5	☐4	☐3	☐2	☐1	☐0
B1.11	Innovation in the port sector activities	☐5	☐4	☐3	☐2	☐1	☐0
B1.12	Other *(please specify and indicate)*						
	a) _____	☐5	☐4	☐3	☐2	☐1	☐0
	b) _____	☐5	☐4	☐3	☐2	☐1	☐0

C. Collaboration between regional ports and other regional organisations

Collaboration means working jointly with others for mutual benefit through exchanging information, adjusting activities, sharing resources, and enhancing capacity of other(s) to achieve a common purpose.

C1. How important are the following to your regional port to build collaboration?

		Extremely important 5	Very important 4	Moderately important 3	Slightly important 2	Not at all important 1	Don't know 0
C1.1	Exchanging information as a pivotal point in supply chain networks	☐5	☐4	☐3	☐2	☐1	☐0
C1.2	Making joint efforts with supply chain actors to increase supply chain efficiency	☐5	☐4	☐3	☐2	☐1	☐0
C1.3	Developing a flexible structural, functional and planning environment consistent to regional demands	☐5	☐4	☐3	☐2	☐1	☐0
C1.4	Sharing port resources for collaboration with regional organisations	☐5	☐4	☐3	☐2	☐1	☐0
C1.5	Having policy support to be involved in collaborative activities with regional organisations	☐5	☐4	☐3	☐2	☐1	☐0
C1.6	Making continuous efforts to increase the number of collaborative activities with regional organisations	☐5	☐4	☐3	☐2	☐1	☐0
C1.7	Making interaction with different sector organisations including non-core or non-maritime businesses	☐5	☐4	☐3	☐2	☐1	☐0
C1.8	Coordinating port-centric logistics networks	☐5	☐4	☐3	☐2	☐1	☐0
C1.9	Having more financial autonomy to port management to join in collaborative regional projects	☐5	☐4	☐3	☐2	☐1	☐0
C1.10	Other *(please specify and indicate)*						
	a) _____	☐5	☐4	☐3	☐2	☐1	☐0
	b) _____	☐5	☐4	☐3	☐2	☐1	☐0

D. Participation of Australian regional ports in regional innovation

Regional innovation requires a planned arrangement for a region to support capability, innovation and competitiveness through utilisation of regional institutions, resources and networks.

D1. How important are the following to your regional port to participate in regional innovation?

		Extremely important 5	Very important 4	Moderately important 3	Slightly important 2	Not at all important 1	Don't know 0
D1.1	Being proactive within the regional networks to exploit the business potential of the region	☐5	☐4	☐3	☐2	☐1	☐0
D1.2	Demonstrating entrepreneurship for regional innovation to enhance regional competitive advantage	☐5	☐4	☐3	☐2	☐1	☐0
D1.3	Having risk sharing approach in business engagement with other regional organisations	☐5	☐4	☐3	☐2	☐1	☐0
D1.4	Participating in regional resource utilisation planning activity and its implementation process	☐5	☐4	☐3	☐2	☐1	☐0
D1.5	Opening port as a knowledge centre for interactive learning for regional organisations	☐5	☐4	☐3	☐2	☐1	☐0
D1.6	Making efforts for capacity enhancement of other regional organisations	☐5	☐4	☐3	☐2	☐1	☐0
D1.7	Providing incentives and support to regional businesses in their early stage	☐5	☐4	☐3	☐2	☐1	☐0
D1.8	Other *(please specify and indicate)*						
	a) _____	☐5	☐4	☐3	☐2	☐1	☐0
	b) _____	☐5	☐4	☐3	☐2	☐1	☐0

E. The Australian regional ports' strategies contributing to regional development

E1. How important are the following for your regional port's involvement in regional development?

		Extremely important 5	Very important 4	Moderately important 3	Slightly important 2	Not at all important 1	Don't know 0
E1.1	Enhance corporate social responsibility	☐5	☐4	☐3	☐2	☐1	☐0
E1.2	Make the port relevant to various interest groups	☐5	☐4	☐3	☐2	☐1	☐0
E1.3	Participate beyond sponsorship in developing social infrastructure such as a community clinic, schools, housing, and regional access facilities	☐5	☐4	☐3	☐2	☐1	☐0
E1.4	Establish a regional buy policy for promoting regional procurement base	☐5	☐4	☐3	☐2	☐1	☐0
E1.5	Communicate effectively with the wider public, community and customers	☐5	☐4	☐3	☐2	☐1	☐0
E1.6	Improve the environmental standards beyond those required under legislation	☐5	☐4	☐3	☐2	☐1	☐0
E1.7	Identify a mix of operational and strategic indicators for measuring port's contribution to regional development	☐5	☐4	☐3	☐2	☐1	☐0
E1.8	Develop a database with stakeholders for research and information sharing	☐5	☐4	☐3	☐2	☐1	☐0
E1.9	Participate in region-centric visionary projects in close cooperation with regional organisations	☐5	☐4	☐3	☐2	☐1	☐0
E1.10	Include regional strategic planning bodies and stakeholders in port's strategic planning process	☐5	☐4	☐3	☐2	☐1	☐0
E1.11	Manage port's own energy consumption nature for improving energy efficiency	☐5	☐4	☐3	☐2	☐1	☐0
E1.12	Other *(please specify and indicate)*						
	a) _____	☐5	☐4	☐3	☐2	☐1	☐0
	b) _____	☐5	☐4	☐3	☐2	☐1	☐0

F. Demographic information

This ***last section*** contains general questions about you, your organisation and the regional port in your region.

F1. Please choose from the following that best describe your organisation.

- ☐ Port authority/corporation
- ☐ Chamber of Commerce
- ☐ Regional development agency
- ☐ Logistics company
- ☐ Transport operator
- ☐ Shipping company
- ☐ Federal government
- ☐ State government
- ☐ Local government
- ☐ Exporter/importer
- ☐ Freight forwarder

Other *(please specify)* _____

F2. Please describe your position in the organisation.

- ☐ Chief Executive Officer/ Division Head
- ☐ General manager/Senior manager
- ☐ Division manager
- ☐ Business owner
- ☐ Manager
- ☐ Executive

Other *(please specify)* _____

F3. Please indicate the state/territory where your organisation is located.

- ☐ NSW
- ☐ VIC
- ☐ WA
- ☐ SA
- ☐ NT
- ☐ ACT
- ☐ TAS
- ☐ QLD

F4. Please indicate the years of your working experiences in- maritime / transport / logistics / shipping/ regional development affairs.

- ☐ 5 years or less
- ☐ 6 – 10 years
- ☐ Over 10 years

F5. What is the major activity of the regional port in your region?

- ☐ Bulk cargo
- ☐ Container handling
- ☐ General cargo
- ☐ Cruise vessels
- ☐ Recreational boats
- ☐ Fishing vessels

Other *(please specify)* _____

F6. To what extent do you interact with the regional port in your region?

- ☐ Full time port employee
- ☐ Regularly
- ☐ Sometimes
- ☐ Occasionally
- ☐ Never

F7. Please identify the name of the Australian regional port located in your region.

_____

Concluding remarks

A summary of the survey result will be provided to you upon request. Please provide your details if you would like to receive a copy of the summary when it is available.

Name: _____

Email address: _____

Thank you for your time!

Thank you very much for contributing to gaining a more informed understanding of Australian regional ports and their contribution to the development of your region

Please save and submit it as this is the end of the survey

PARTICIPANT INFORMATION SHEET
SOCIAL SCIENCE/ HUMANITITES RESEARCH

Title of Project: The Strategic Role of Australian Regional Ports in Regional Development

Invitation

You are invited to participate in a study into 'The Strategic Role of Australian Regional Ports in Regional Development'. The study is being conducted by Quazi MH Sakalayen, a PhD candidate supervised by Dr Peggy Chen and Dr Stephen Cahoon, from the Department of Maritime and Logistics Management, Australian Maritime College, University of Tasmania.

1. What is the purpose of this study?

The purpose of this study is to explore the strategies used by Australian regional ports to contribute and enhance regional development. The study examines the relationship between Australian regional ports and their regions; explores whether Australian regional ports are drivers for regional development; and will recommend strategies Australian regional ports can adopt to enhance regional development.

2. Why have I been invited to participate in this study?

You are invited to participate in this study because you are one of the key stakeholders of Australian regional ports.

3. What does this study involve?

This study needs your participation by completing an on-line survey that examines your views of the strategies used by Australian regional ports for achieving the sustainability of the port's businesses and regional economy. The survey through SurveyMonkey will take only 20 minutes of your time to complete. If you wish to take part in the study, simply click on the Web link indicated in the email and complete the questionnaire. Receiving your completed questionnaire implies your consent for participating in this survey.

It is important that you understand that your involvement is this study is voluntary. While we would be pleased to have you participate, we respect your right to decline. There will be no consequences to you if you decide not to participate. If you decide to discontinue participation at any time,

you may do so without providing an explanation. You may ask that any data you have provided to date be removed from the study.

All information will be treated in a confidential manner, and your name will not be used in any publication arising out of this study. In the final report, you will be referred to by a numeric pseudonym. We will remove any reference to personal information that might allow someone to guess your identity. To do this, the researcher will de-identify the data before it is analysed. This means that your name and contact details will be kept in a separate, password-protected computer file from any information that you provide. All of the study will be kept in a locked cabinet in the office of the Department of Maritime and Logistics Management and will be destroyed at least five years after the data has been published.

4. Are there any possible benefits from participation in this study?

The expected outcome of this study is to provide a range of strategies you may be able to implement for the port's and its region's sustainable development and growth. This study may also assist in accelerating the understanding of how economic and geographical disadvantages can be reversed.

By exploring a port's social and economic contribution to regional development, including its relationship with other businesses and government, this study will also showcase the challenges, differences, and opportunities for regional ports compared with the metropolitan ports.

5. Are there any possible risks from participation in this study?

There are no specific risks anticipated with participation in this study.

6. What will happen to the results of the study?

This study constitutes the source of primary information and data for the student investigator's doctoral thesis. The findings may later be presented or published at conferences and in other academic arenas, including journals. Copies of such publications can be supplied upon request to any participant in the study.

7. What if I have questions about this research?

If you would like to discuss any aspect of this study please contact the student investigator or the chief investigator(s):

Student Investigator:

Quazi MH Sakalayen, PhD Candidate
Department of Maritime and Logistics Management, Ph: +613 6324 9831
Email: quazis@amc.edu.au

Chief Investigator:

Dr. Peggy Chen, Lecturer
Department of Maritime and Logistics Management, Ph: +613 6324 9694
Email: P.Chen@amc.edu.au

Chief Investigator:

Dr. Stephen Cahoon, Acting Deputy Director
Department of Maritime and Logistics Management, Ph: +613 6324 9769
Email: s.cahoon@amc.edu.au

You are welcome to contact us to discuss any issue relating to this study. Once we have analysed the information, a summary of our findings can be emailed to you upon your request.

This study has been approved by the Tasmanian Social Science Human Research Ethics Committee. If you have concerns or complaints about the conduct of this study should contact the Executive Officer of the HREC (Tasmania) Network with the ethics reference number H0012289 on (03) 6226 7479 or email human.ethics@utas.edu.au. The Executive Officer is the person nominated to receive complaints from research participants.

Thank you for taking the time to consider this study.
This information sheet is for you to keep.

Appendix H

Table H-1: Descriptive statistics of the items

Item no./IV	Frequency	Mean	5% trimmed Mean	Median	SD	Skewness	Kurtosis
Question A1							
A1.1	101	4	4.14	4.0	1.13	-0.73	0.50
A1.2	101	3.86	4.01	4.0	1.27	-0.55	0.37
A1.3	97	4.15	4.23	4.0	0.78	-0.48	0.32
A1.4	100	3.84	3.89	4.0	0.96	-0.65	-0.12
Question A2							
A2.1	101	3.55	3.62	4.0	0.91	-0.42	0.65
A2.2	101	2.55	2.57	3.0	1.19	-0.21	-0.84
A2.3	100	3.10	3.14	3.0	1.18	-0.57	0.05
A2.4	100	3.11	3.17	4.0	1.41	-0.64	-0.67
A2.5	99	2.73	2.75	3.0	1.24	-0.41	-0.39
Question A3							
A3.1	101	4.08	4.15	4.0	0.89	-0.20	0.48
A3.2	101	3.51	3.55	4.0	1.04	-0.56	-0.44
A3.3	101	4.11	4.18	4.0	0.75	-1.21	0.13
A3.4	101	3.51	3.56	4.0	1.04	-0.65	-0.21
A3.5	101	4.07	4.17	4.0	0.85	-0.52	0.70
A3.6	101	3.21	3.23	3.0	1.00	-0.37	-0.56
Question A4							
A4.1	100	4.17	4.28	4.0	0.90	-0.79	0.15
A4.2	100	4.02	4.11	4.0	0.95	-0.40	0.03
A4.3	100	3.30	3.38	3.0	1.24	-0.82	0.51
A4.4	99	3.39	3.46	4.0	1.21	-0.66	0.10
Question B1							
B1.1	101	4.69	4.74	5.0	0.50	-0.32	0.72
B1.2	101	3.95	4.02	4.0	0.90	-0.25	0.39
B1.3	101	4.45	4.51	5.0	0.69	-0.23	0.73
B1.4	101	3.48	3.54	3.0	1.07	-0.65	1.00
B1.5	99	3.53	3.57	4.0	0.92	-0.84	0.86
B1.6	101	3.82	3.87	4.0	0.84	-0.68	0.15
B1.7	100	4.30	4.38	4.0	0.82	-0.28	0.01
B1.8	101	3.47	3.46	3.0	0.82	-0.05	-0.49
B1.9	101	2.81	2.80	3.0	1.40	-0.06	-0.15
B1.10	101	3.63	3.72	4.0	1.09	-0.15	0.37
B1.11	100	4.25	4.31	4.0	0.74	-0.89	0.82
Question C1							
C1.1	101	4.15	4.18	4.0	0.67	-0.38	0.07
C1.2	101	4.25	4.31	4.0	0.74	-0.94	0.50
C1.3	101	4.22	4.26	4.0	0.72	-0.68	0.41
C1.4	101	3.93	3.99	4.0	0.91	-0.68	0.20
C1.5	101	4.01	4.06	4.0	0.84	-0.63	0.46
C1.6	101	3.87	3.92	4.0	0.92	-0.54	-0.07
C1.7	101	3.62	3.69	4.0	1.04	-0.94	0.68
C1.8	101	4.07	4.15	4.0	0.91	-0.85	0.43
C1.9	100	3.66	3.73	4.0	1.09	-0.89	0.14

Continued to the next page

Appendix H

Table H-1: Descriptive statistics of the items (continued)

Item no./IV	Frequency	Mean	5% trimmed Mean	Median	SD	Skewness	Kurtosis
Question D1							
D1.1	101	4.12	4.20	4.0	0.85	-0.72	0.80
D1.2	101	3.95	4.03	4.0	0.91	-0.28	0.28
D1.3	100	3.54	3.59	4.0	0.94	-0.61	0.59
D1.4	101	3.68	3.77	4.0	1.07	-0.05	0.76
D1.5	101	2.88	2.92	3.0	1.30	-0.45	-0.35
D1.6	100	3.15	3.20	3.0	1.18	-0.56	0.03
D1.7	101	3.11	3.15	3.0	1.26	-0.46	-0.25
Question E1							
E1.1	101	3.34	3.35	3.0	0.89	-0.28	0.23
E1.2	101	3.26	3.30	3.0	1.04	-0.54	0.33
E1.3	101	2.67	2.66	3.0	1.18	.000	-0.57
E1.4	101	2.85	2.85	3.0	1.17	-0.24	-0.76
E1.5	101	3.80	3.86	4.0	1.00	-0.69	-0.01
E1.6	101	3.41	3.43	4.0	1.06	-0.37	-0.16
E1.7	101	3.74	3.79	4.0	0.98	-0.58	-0.04
E1.8	101	3.28	3.32	3.0	1.08	-0.28	-0.02
E1.9	100	3.44	3.50	4.0	1.22	-0.57	-0.29
E1.10	100	3.88	3.96	4.0	0.92	-1.09	0.60
E1.11	99	3.47	3.51	4.0	1.00	-0.58	0.43

Table H-2: Communalities (Initial run, PCA extraction)

	Initial	Extraction
E1.1	1.000	.699
E1.2	1.000	.470
E1.3	1.000	.549
E1.4	1.000	.396
E1.5	1.000	.470
E1.6	1.000	.464
E1.7	1.000	.486
E1.8	1.000	.512
E1.9	1.000	.520
E1.10	1.000	.403
E1.11	1.000	.589
B1.1	1.000	.424
B1.2	1.000	.520
B1.3	1.000	.552
B1.4	1.000	.562
B1.5	1.000	.560
B1.6	1.000	.426
B1.7	1.000	.510
B1.8	1.000	.460
B1.9	1.000	.329
B1.10	1.000	.342
B1.11	1.000	.534
C1.1	1.000	.520
C1.2	1.000	.433
C1.3	1.000	.696
C1.4	1.000	.697
C1.5	1.000	.722
C1.6	1.000	.766
C1.7	1.000	.517
C1.8	1.000	.611
C1.9	1.000	.466
D1.1	1.000	.575
D1.2	1.000	.628
D1.3	1.000	.523
D1.4	1.000	.508
D1.5	1.000	.601
D1.6	1.000	.643
D1.7	1.000	.715

Appendix H

Table H-3: The SPSS output of four-factor (final) unrotated component matrix

Component Matrix[a]

	Component			
	1	2	3	4
D1.2	.742	-.128	.274	.115
D1.6	.706	-.428	.093	-.196
C1.5	.705	.169	-.223	-.454
D1.1	.695	-.089	.281	.163
D1.7	.686	-.431	.106	-.317
D1.5	.675	-.426	.164	-.090
C1.8	.670	.120	.344	.001
C1.4	.662	.066	-.349	-.478
C1.6	.659	.164	-.270	-.502
B1.5	.659	-.236	.202	.154
B1.4	.653	-.303	.120	.125
E1.1	.634	-.009	-.467	.158
B1.7	.625	.297	.182	-.033
B1.8	.570	-.121	-.435	.311
C1.1	.569	.447	-.043	.054
B1.11	.564	.385	.272	-.062
E1.6	.541	-.304	-.336	.332
C1.2	.498	.450	-.082	.147
E1.11	.495	-.172	-.445	.472
B1.3	.437	.318	.175	.425
C1.3	.582	.610	-.015	.109
B1.10	.236	-.034	.643	.054

Extraction Method: Principal Component Analysis.

a. 4 components extracted.

Appendix H

Tables H-4: Initial findings- Model fit during CFA

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	50	383.459	203	.000	1.889
Saturated model	253	.000	0		
Independence model	22	1376.559	231	.000	5.959

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.066	.756	.696	.606
Saturated model	.000	1.000		
Independence model	.276	.251	.179	.229

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.721	.683	.846	.821	.842
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.879	.634	.740
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	180.459	129.086	239.646
Saturated model	.000	.000	.000
Independence model	1145.559	1032.435	1266.158

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	3.835	1.805	1.291	2.396
Saturated model	.000	.000	.000	.000
Independence model	13.766	11.456	10.324	12.662

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.094	.080	.109	.000
Independence model	.223	.211	.234	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	483.459	513.329	614.215	664.215
Saturated model	506.000	657.143	1167.625	1420.625

Appendix H

Model	AIC	BCC	BIC	CAIC
Independence model	1420.559	1433.702	1478.092	1500.092

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	4.835	4.321	5.426	5.133
Saturated model	5.060	5.060	5.060	6.571
Independence model	14.206	13.074	15.412	14.337

HOELTER

Model	HOELTER .05	HOELTER .01
Default model	62	66
Independence model	20	21

Appendix H

Tables H-5: Final findings- Model fit during CFA

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	32	64.279	59	.297	1.089
Saturated model	91	.000	0		
Independence model	13	779.403	78	.000	9.992

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.049	.912	.864	.591
Saturated model	.000	1.000		
Independence model	.336	.311	.196	.266

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.918	.891	.993	.990	.992
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.756	.694	.751
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	5.279	.000	28.927
Saturated model	.000	.000	.000
Independence model	701.403	615.577	794.680

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.643	.053	.000	.289
Saturated model	.000	.000	.000	.000
Independence model	7.794	7.014	6.156	7.947

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.030	.000	.070	.753
Independence model	.300	.281	.319	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	128.279	138.697	211.962	243.962
Saturated model	182.000	211.628	419.976	510.976

Appendix H

Model	AIC	BCC	BIC	CAIC
Independence model	805.403	809.635	839.399	852.399

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	1.283	1.230	1.519	1.387
Saturated model	1.820	1.820	1.820	2.116
Independence model	8.054	7.196	8.987	8.096

HOELTER

Model	HOELTER .05	HOELTER .01
Default model	122	136
Independence model	13	15

Proceedings of the IAME 2013 Conference
July 3-5 – Marseille, France
Paper ID 53
The Strategic Role of Australian Regional Ports in Regional Development: An Exploration of Port Stakeholders' Perceptions

Quazi MH Sakalayen
Shu-Ling Chen
Stephen Cahoon

presented for further investigation of the contribution of ports in regional development.

Keywords: Regional ports, regional development, port stakeholders, port strategy.

1. Introduction

Ports have evolved from being a gateway through which goods and passengers are transferred between ships and the shore (Goss 1990c) to a 'vital part of the supply chain and as a natural focus for regional development and employment initiatives' (Pettit and Beresford 2009, p.253). A port provides a vibrant network platform for regional development (Haralambides 1997) where initiatives for innovation, cluster formation, community involvement, environment protection, and efforts of enhancing social capital may germinate.

The term 'region' may mean: a group of nations (international context) or a group of sub-national areas (national context). The region is also central to regional development research because of the disparity from region to region in achieving fundamental socio-economic and environmental attributes such as employment, income, health and educational attainments, standard of livelihood and services (Beer et al, 2003). In Australia, a region mainly includes non-metropolitan and rural areas and the discussion on regional issues is very much influenced by and debated in the political landscape (Beer et al, 2003). In terms of regional ports, various classifications can be found in the literature but with no unified definition. For example, Bichou (2009) classifies regional ports from a hinterland or spatial market perspective, while Vleugels (1969) describes small ports as being 'regional ports' that only handle cargo imported into or exported from the respective port-regions. For the purpose of this study, the term 'region' or 'regional' relates to the national context and the term 'regional port' is defined as a port outside bigger metropolitan centres serving regional enterprises.

The concept of 'port stakeholders' was initially contributed by Notteboom and Winkelmans (2002) for port management. They categorise port stakeholders into internal and external stakeholders from a port authority perspective and address stakeholders' impacts on port operations and management. Several studies of involving port stakeholders in port development and strategic planning have been done, for example Moglia and Sanguineri (2003), Dooms and Verbeke (2007), Winkelmans and Notteboom (2007), and Denktas-Sakar and Karatas-Cetin (2012). This study takes a broader dimension of 'port stakeholders' concept which

includes different groups with interests in port and in its host region to enhance regional development. Following the concept of port stakeholders by Notteboom and Winkelmans (2002), this study uses port officials as an internal stakeholder and other port stakeholders including port users, businesses organisations, chamber of commerce, logistics service providers, concerned government officials, regional development agencies and local community as external stakeholders.

The relationship between a port and its region has been studied by scholars from different perspectives. One group of scholars argue that a port is as an engine of growth in local and regional development (Bichou, 2009, Bryan et al, 2006, Haralambides, 1997, Jung, 2011), while others consider a port as merely satisfying demand by providing support in freight transportation activities (Damesick 1986; Fujita & Mori 1996; Goss 1990c; Grobar 2008; McCalla 1999; Rodrigue 2003). Notteboom et al, (2009) consider port development and regional growth as two different progressions that are indirectly and intermittently related. The common denominator of these varying views is that a port is very much engaged with its region.

A port's contribution to regional development is of an inter-disciplinary nature which as yet has gained little attention, possibly due to the absence of an effective benefit quantification method (Ducruet 2009) and useful frameworks (Ducruet & Zaidi 2012). This paper explores the perceptions of Australian regional port stakeholders on the strategic role of ports in regional development and how regional ports may become better involved in regional development.

The rest of paper is structured as follows. Section 2 provides a literature review on the relationship between a port, its host region, and regional development including its regional innovation system (RIS). Section 3 introduces Australian ports and explains the research methodology. Section 4 reports the findings of the telephone interviews with Australian regional port stakeholders. Section 5 presents the discussion including a conceptual model for investigating the contribution of ports to regional development. Section 6 presents the conclusion.

2. A port and its host region: A symbiotic relationship

2.1 Port-region

The overarching concept of port-region, defined by De Langen (2008) as the primary port area including adjacent municipalities with transport and logistics firms, should emphasise the possibility of port expansion and growth in a multi-

dimensional network situation. From this perspective, port-region might be regarded as the administrative district in which a port is situated connecting the port hinterland where port activities and port users' activities induce and influence the social, economic and environmental sphere of life (see figure 1). This overarching conceptualisation of port-region fits with the Australian regional ports scattered along the vast coastline having a varying degree of proximity, contestable hinterlands, and geographical characteristics with the neighbouring ports.

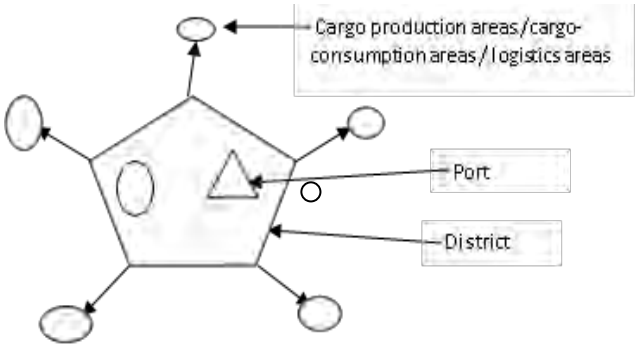


Figure 1 - A conceptual view of port-region (Source: Author)

2.2 Regional development and port infrastructure

Regional development attempts to improve the livelihood and socio-economic situation of a region by supporting employment and generating wealth through economic activities (OECD 2011). The consensus among the people, communities, and businesses of a region for serving a common purpose and creating a reason for co-operation is crucial for regional development where a leadership role is essential (Beer et al, 2003). Literally the dimensions and factors of regional development efforts are multifarious (Collits, 2004, Nermend, 2009, Sorensen et al, 2007). Regional development is accelerated by the regional innovation system (RIS) with integral support of appropriate infrastructure in the region. The systemic relations among the regional organisations flourish in intense agglomeration situation with the support of quality infrastructures. This is a pre-requisite for innovation (Cooke et al, 1997) where regional organisations' activities are the positive catalysts for regional innovation development (Moulaert & Mehmood 2010). RIS is a planned arrangement for a region to support capability, innovation and competitiveness (Moulaert & Mehmood 2010).

Regional development policy focuses on the overall improvement of the standard of living and immediate needs of the region, while regional innovation policy focuses on competitive advantages and providing a systemic approach for sustainable growth of the region. Diversity of regional know-how and use of

regional assets remain at the core of regional development strategy (Colletis-Wahl & Pecqueur 2001). Innovation is now considered as being a significant factor for economic dynamism and a source of competitive advantage (Mas-Verdu et al, 2010). As a result, innovation policy remains as the axis of regional and national economic development policies (Asheim 2007). Innovation stimulates value creation through regional resources. The existence of Australian regional ports at the coupling point of various networks in regions creates a role for ports to play in the regional innovative network.

The provision of infrastructure in the region can attract future investment and the effective utilisation of that infrastructure follows it as consequences (Hall 2002). Despite the debate that infrastructure follows or fosters, it is a set of supportive attributes which contribute to regional development as a production factor along with labour and capital (Rietveld 1989). However, infrastructure alone cannot contribute to regional development rather it is the facilitating tool for creating an environment for regional development. Gaffikin and Morrissey (2001) suggest that appropriate physical infrastructure is the hardware for a sustainable regeneration of a region, along with the software - education, training, business attraction and social inclusion – and heartware that includes cultural synergy and desire which is a mixture of social capital, dynamic drive, enterprise, co-operation and objective to achieve targets.

In an international and national regional context, the contribution of a port as infrastructure to economic development is well recognised due to its ability to facilitate trade and transport, generate employment and attract investment (UNESCAP 2005; Mangan & Cunningham 2000; Bryan et al, 2006). In this competitive global market, import and export go hand in hand in maintaining a complementary relationship for regional growth. The services of a regional port can link industries, production, and markets, that is, supply and demand, which ultimately promotes regional products and innovation (Chen et al, 2010a). All of this amounts to being significant elements for gaining competitive advantage, and thus contributing to regional development (Hoyle 1983 in Cahoon 2004) .

2.3 The role of a port in its region

The degree of involvement of a port in its host region is recognisable from the evolution of a port's role as a result of rapid changes in technology, working practices, commercial environment and political dimensions (Pettit & Beresford 2009). Verhoeven (2010) suggests that ports should be involved in the wider logistics network, providing value-added services, and facilitating numerous activities in the region including entrepreneurial tasks. He presents a port

authority as a 'community manager' or 'cluster manager'. The role of ports as a network leader in a network hub addresses the port community through a stakeholder management approach (Cahoon et al, 2013). The role of ports in the context of port-region relationship and their engagement in their host regions are described below.

2.3.1 Trade and transport facilitator

A port is a fundamental element and facilitator between trade and transport (Branch 1986). As a port provides an important link between transport modes, it supports the efficiency of a transport chain through effective trade facilitation (Mangan & Cunningham 2000). The characteristics and importance of this facilitating role becomes more apparent when a port acts as a point of multifarious trade activities for the maritime-land interface. This includes the convergence and divergence of traffic and transport modes as the backbone of value driven supply chains flowing through the port-regions.

2.3.2 As a node in the supply chain

In capturing, expanding and retaining value added activities, the appropriate transport chain elements in regions are critical in relation to supply chains (Rodrigue et al, 2013). Panayides and Song (2009) suggest ports are an important element in supply chains because of their ability to facilitate interconnectivity and inter-modality. Various intermediary services such as storage, warehousing and value added services including procurement, pre-assembly, packaging, and labelling, take place in the port-regions (Carbone & De Martino 2003; Pettit & Beresford 2009). These require intimate coordination and collaboration within and between supply chains to achieve competitive advantage (Hall & Jacobs 2010). Coordinated port-based value added logistics services in distriparks, distribelts, and ICDs strengthen the integration of port in the supply chain (Pettit & Beresford 2009). The role of ports in the integration of a supply chain is pivotal as it may provide communication through interconnectivity and interoperability, reduce operation costs through elimination of wastage and help provide timely customer services. This role for port fits well with a port regionalisation model, a process described by Notteboom and Rodrigue (2005) and Rodrigue and Notteboom (2010), that expands hinterland and/or foreland reach of a port. This enables port system development to extend beyond the port perimeter and enhance the competitive position of the port in the region.

2.3.3 Economic strategist

Ports play an economic strategist role where port's services and activities generate socio-economic wealth and benefits for the markets and regions they serve

(Bichou 2009). The presence of ports in the region attracts businesses and increases trade and supports economic development. Recognising this, ports participate actively in regional economic policy initiatives. An example of this is Bryan et al's (2006) suggestion that industries in the south Wales region of the UK are dependent on the port and argue that the port is potential for generating multiplier effects in that economy. Similarly, policy makers such as the House of Commons Transport Committee (2007) in the UK state that a port should be proactive and acts as an economic development catalyst and strategist. It supports the perception of a port oriented regional economy model where a port acts as an integral part of the economy and develops as a spatial and regional phenomenon (Bichou 2009; Ducruet 2009).

2.3.4 Gateway in a network system

A port acts as a gateway in several types of networks and chains and plays a complex but coherent role for the region in which it is embedded. A gateway is a network point or node that allows entrance from one network to another (Notteboom 2009). Ports, acting as a gateway and providing access to extensive inland logistics, therefore play a significant role in global commodity chain and logistics networks (Notteboom & Rodrigue 2007), and in extending to industrial networks (Van Der Lugt & De Langen 2007). A port is not only an intersection of two transport networks, the sea side and land side, but also a multi-purpose gateway (Verhoeven 2010) where several transport networks may criss-cross each other at ports. This indicates the role of a port as a hub, where cargoes are accumulated heavily from various networks and are transhipped or distributed for the next leg of the journey. From a political dimension, Pettit and Beresford (2009) describe ports as a vital part of the supply chain network with an inherent natural potential for regional development.

2.3.5 Regional enabler

Ports are crucial to support the growth of a nation's trade and economy (Branch 1986) which in turn contributes to regional development in the national context. A port might augment the region, offer economic dynamism and investment in a region, become a physical conduit for the transfer of new technology and ideas (Bryan et al, 2006), and be an innovation platform for regional development (Chen et al, 2010a). It can also play a role through marketing a regional level which may improve tourism, foreign direct investment and create demand for regionally produced goods and services (Bryan et al, 2006).

The co-dependency of a port and the region suggests a wider role of the port in the region (Chen et al, 2010b). For example, a port's direct role in regional

development through an effective integration of ports in regional economies rather than an indirect supporter or facilitator for regional development should be considered (Jung 2011). Chen et al (2010) suggest that regional ports may proactively act as a network leader in its region. This can be achieved through collaboration in a cooperation/competition matrix (McLaughlin & Fearon 2013), by nurturing regional innovation factors by forming new development channels, linkages, and networks that are extended to various government levels, stakeholders, and port users (Cahoon et al, 2013).

3. Research methodology

3.1 Australian regional ports (ARPs)

As an export oriented island nation shipping is the backbone of the Australian economy, where ports are regarded as the strategic infrastructure interlinking every aspect of shipping and port-bound freight movement (GHD 2010e). In Australia, there are 70 ports that play an important role as connectors between sea and land transportation in regional, national and international trade. Five of these are metropolitan ports - Sydney, Melbourne, Adelaide, Brisbane, and Fremantle port. The remaining 65 are referred to as regional ports, performing about 85% of the total cargo handling task. Australian ports are mostly state owned commercial enterprises operating under different corporatisation models with some being privatised. Studies show that the port freight task in Australia doubles every ten years (GHD, 2010, Infrastructure Partnerships Australia, 2009) . This rapid growth of the freight task has been driven by a 183 per cent growth in bulk freight and a 250 per cent increase in non-bulk freight (Infrastructure Partnerships Australia 2009a).

The National Ports Strategy (NPS) of Australia seeks to develop efficient port infrastructure linking with freight logistics by identifying four areas of action: port planning and infrastructure, protecting the ability to execute plans, improving landside efficiency and reliability, and ensuring clarity, transparency and levels of responsibility (Infrastructure Australia 2010a). The consistency among the national land freight strategy, transport infrastructure and the national ports strategy in terms of interoperability, network improvement, planning, ownership, regulation, and community service obligations is the cornerstone in providing competitive advantage for Australian regional products (Infrastructure Australia 2011). This will require a regional innovation platform involving regional ports. Although regional ports in Australia have immense potential, strategically the

growth and sustainability issues of these ports still require profound attention (Newlyn 2009).

3.2 Research methodology

This study uses a semi-structured telephone interview for exploring the perceptions of Australian regional port stakeholders on the strategic role of ports in regional development. A snowball sampling technique was adopted to select participants for the semi-structured telephone interview as it was assumed that experienced participants both from port officials and other port stakeholders may be difficult to identify and therefore requesting participants to recommend others from their referral networks would be a useful strategy (Cooper & Schindler 2011). A total of 38 interviews were conducted, with the average interview duration being 40 minutes, ranging from 23 to 61 minutes. Table 1 presents the demography of interviewees.

Table 1- Demography of telephone interview participants

Classification	No. of port official participants	No. of other port stakeholder participants	No. of total participants
Designation:	-	-	
Chief Executive Officer (CEO) or Equivalent	12	7	19
General Manager (GM) or Equivalent	5	5	10
Harbour Master (HM) / Business Development Manager or Equivalent	3	6	9
Experience:	-	-	
5 years or less	6	3	9
Within a range of 6 to 10 years	4	5	9
Over 10 years	10	10	20
Total	20	18	**38**

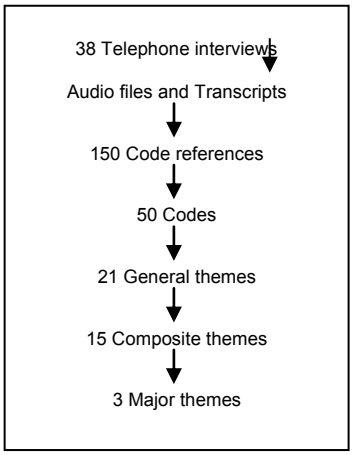


Figure 2 - Telephone interview data analysis flow

An inductive thematic data analysis was performed with the use of N Vivo 10 software and traditional manual techniques. The mixture of software and manual techniques were adopted to reduce the risk of losing any context during the data analysis process (Sandelowski 2003). Data analysis included techniques such as the selection of nodes, creation of codes and themes, identification of quotes that reflect the tone of the responses, transforming data in terms of the quantification of the qualitative data, and identification of extreme outliers (Creswell & Plano Clark 2011). Beside manual techniques such as code frequency and code occurrence matrix across nodes, some specific N Vivo techniques such as text search, word frequency, tree map, matrix coding, and cluster analysis were used to support the thematic analysis (see figure 2 for data analysis flow). The central

objective of the data analysis was to explore the reality, underlying reasons, and rationale for better engagement of the Australian regional ports to regional development.

4. Findings

The telephone interview findings are reported in this section in terms of five nodes emerged during the concomitant processes of literature review and semi-structured telephone interview questionnaire preparation. Subsequently, N Vivo 10 data were arranged in accordance to theses nodes for thematic analysis. The three major themes emerged from the thematic analysis are port sustainability, building collaborative advantages and active participation of port in RIS, which have been further discussed in the next section.

4.1 Port-region relationship of ARPs

The support of port stakeholders is critical for effective growth of the port. Although port officials viewed that ports enhance social capital, other port stakeholders believed this was a potential area of growth for ports. It also appears that the absence of a systematic approach to build social capital exists in the port region. Both groups of participants agreed with the necessity of enhancing trust and networks among regional businesses and entities, but do not have enough innovative initiatives and connection with the long term sustainability of regional businesses.

Port activities in the region, according to interview participants, included regular dissemination of port information; sponsorships for community activities, environment, sporting and in some regional businesses; maintaining sister-city and sister-port relationship; acting as a partner of the government led economic council or zone or triangle; funding local authorities to build community infrastructure such as sewage treatment plant; providing avenue and information on export-import for regional businesses; providing fuel supply for remote regions; implementing a local buy policy; and managing amenity impacts to integrate the port with the city.

In strengthening the port-region relationship, the port stakeholders, particularly from the government sector, would like to designate regional ports as the objective stakeholder of supply chains because ports should be proactive in ensuring efficient performance of the overall supply chain. The port officials however, were more interested in demand-based integration of the supply chain

and planning for common interest and developing partnerships within the supply chain.

4.2 ARPs and regional development

The port official participants agreed that ports should support regional development efforts as it would bring mutual benefits both for ports and the regions. Nevertheless, they have not been directly involved in government's regional development programmes as they did not think it is their core business. In this regard, two port official participants commented that the port can be involved in regional development from a lobbying level rather than production level. The reasons for these comments might be due to the lack of policy and legislative support and poor financial capability of the ports. For instance, in contrast to some European and US ports, one port official participant stated that ports cannot play an active role in power generation as it is not an efficient player in this regard and the state's legislation also need to change if a port wants to play a direct role.

The majority of interview participants expressed that regional ports' contribution to regional development are mostly related to strengthening the port-region relationship. It appears that the ARPs may contribute in various regional development dimensions to varying extent in different phases of a port's growth. Most of the ARP's contributions to regional development at present are focused towards addressing economic dimensions. The social dimensions are partially addressed through their sponsorships programmes and as part of their corporate social responsibility. Environmental dimensions are moderately served through implementing environment upgrading projects and practicing specific norms such as creating buffer zones and adopting noise reduction measures. As for the strategic dimension, this is addressed partly by being represented in regional bodies at the planning and lobbying level and by implementing specific port expansion projects. Table 2 illustrates a comparison and contrast between a port and a general perspective on important regional development factors.

To address regional development factors from both standpoints, the participants emphasised the need for an effective integration of ports with regional businesses, resources, and supply chains. In general, it was found that the involvement of Australian regional ports in regional development varies from region to region because of the different characteristics and demands of the regions.

Table 2: Important regional development factors

Port perspective	General perspective
• Transport infrastructure efficiency connecting the port • Connectivity of port with road and rail • Integration of port with the city and market • Research & development induced commercial framework of port • Consistent coupling between the port and resource sector • Port planning capability • Region supported port development • Port involvement in organisational collaboration • Port involvement in regional innovation	• Supply of energy • Access to cheaper power • Availability of water • Comprehensive network of both social and economic infrastructure • Capability to cope or adjust with bad weather • Enhancement of manufacturing base of the region • Competitiveness of regional products • Population growth and demand of population

The port planning environment and capability, transport efficiency connecting ports in the region, port-centric organisational collaborations in regions, and the prospect to be a platform for region was found to be a future crucial element for Australian regional ports.

4.3 ARPs' current issues

The interview results indicated that the current issues of Australian regional ports are multifarious and vary with geographic position of the port and distance from the markets, for example, the regional ports serving the mining or resource sector are more aloof from the community. In the hinterland of these ports, the rail-mining connectivity and operation are not well coordinated mainly because of different nature of the capital requirement, and the different payback timeframe for mining and rail sector funding. Some mining companies are also practicing fly-in and fly-out for workforce employment which creates tension in the region for the growth of housing facilities, schools, and other services significant for regional development. This can be contrasted against the remote regional ports with agricultural hinterlands and small manufacturing base due to the lack of population, lack of demand, lack of innovation in the region, and absence of appropriate port connectivity between the regions and transport infrastructure. The issues hovering around ARPs include poor port performance in utilising port capability or catering for the demand of the host region and a poor relation with regional entities in configuring the regional resources. Others include a lack of entrepreneurship and innovation in capitalising regional strengths, poor port performance in supply chain efficiency and networking, and inefficiencies in addressing regional problems and weakness for gaining regional competitive advantage.

4.4 ARPs' pro-activeness in regional entrepreneurial activities

A mixed perception was found among the participants on the issue regarding ports' involvement in joint or multi-stakeholders initiatives. The majority of port official participants suggested that ports should be involved at a planning level for the region where ports' commercial interests are directly involved. As one port official expressed:

> *We don't get involved in joint ventures and that actually free us to move across all customer bases and our job is to be very active in nurturing existing customers, learning future customers, providing efficiency in supply chain and it is much cleaner way to be able to move across all segments by not being involved in joint ventures. -TIP (Telephone Interview Participant) #22*

Other port stakeholder participants, however, agreed with the view that the port should be involved in regional businesses and joint ventures if necessary. Table 3 depicts the different views on ports' involvement in regional entrepreneurial activities between port official and other stakeholder participants.

Table 3: Different participants' views on ports' involvement in regional business activities

Port officials	Other port stakeholders
1) Ports engagement with the community is sufficient.	**1)** Ports community involvement is not adequate enough.
2) Interested in ports' demand-based integration of the supply chain, planning for common interest and developing partnerships within the supply chain.	**2)** Interested to designate regional ports as the objective stakeholder of supply chains because ports should play a proactive role in ensuring efficient performance of the overall supply chain.
3) Ports can be involved in regional development from lobbying and planning levels when ports' commercial interests are directly involved.	**3)** Ports' participation in joint and multi-stakeholder initiative does not necessarily link to commercial interests. Ports should be involved in regional business and joint ventures if necessary or at least should promote regional businesses indirectly.
4) Port governance does not have impacts on ports participation in RIS.	**4)** Private ownership of port may improve port's participation in RIS.
5) The procedure for planning approval should be more flexible.	**5)** Most Australian regional ports do not have long term plan which is an important element port development and port sustainability.

The poor financial performance of the regional ports, different nature of the joint or multi-stakeholders initiatives among ports, and the size of the ports may be reasons why there were mixed views of port involvement in joint or multi-stakeholders initiatives. The lack of legislative support, absence of financial

delegation and authority, and lack of entrepreneurial leadership in the region may have further contributed to this.

4.5 ARPs' participation in the RIS

The participants agreed that a port can be a reference frame for concerned port-region, where organisations can meet together and interact with each other for seeking mutual benefits, to support capability, innovation, and competitiveness in the regional network system. Additionally, they perceived that the RIS can be a working framework to nurture the symbiotic relation between the port and region where all stakeholders will recognise the importance of each other within the socio-economic, geographic and environmental matrix.

The participants disclosed that the generation of innovative ideas in the RIS could be developed from collaboration among organisations, taking a long term holistic perspective, seeking common interest, developing ports as a knowledge hub for regional supply chains, seeking skill development and training through educational institutes, and engaging with customers and community. To some extent this is already occurring in regional ports, for instance, development of housing projects with the community to decrease the tension created in the region for fly-in and fly-out staff in the resource sector.

The interview results also revealed that port governance may have impacts on ports participation in RIS. This has been reflected in one comment as follows:

> *For example, we are seeing enormous amount of innovation coming in through the leadership of new private owners of…(name of three ports)….ports. But, most other ports lack innovation, drive, and objective to do regional innovation or regional development. -TIP (Telephone Interview Participant) #08)*

With regard to whether regional ports can play a network leadership role, the participants from resource ports expressed that it depends on the circumstance and place of the port. Although they believed ports are an important player in the region, they are not 'the' most important player but noted they can influence other parties along the supply chain to work together.

The participants from government positions emphasised that a regional port's willingness to participate in the RIS should be reflected in its goals and objectives, and recommended regional ports to be a network leader and an economic strategist in the RIS. Port officials revealed that for this to occur, information

sharing without breaching or compromising client's confidentiality is a key element.

5. Discussion

The empirical results suggested three major directions for Australian regional ports to become better involved in regional development - port sustainability, building collaborative advantage, and being an active participant in the RIS. Each of these is discussed below.

5.1 Port sustainability

It is argued that port sustainability is required to be better involved in regional development as it will enable business viability, a more nurturing environment, enhanced social capital and more public-private partnerships. The research outcomes also indicate the necessity of the development of a long term plan and port planning capability as the critical prerequisite and building block for port sustainability. Port sustainability also refers to business strategies and activities that provide a balance between the current and future requirements of the port and its stakeholders while pursuing economic prosperity, environmental quality and social responsibility (Bailey 2009; Hinds 2008). Ensuring financial viability is an important economic aspect of port sustainability, whereas the environmental aspect emphasises the protection of the environment through internalising the externalities, and the social aspect focuses on building social capital through ensuring community well-being and gaining community confidence. The positive financial performance of the port and the efficiency of supply chains running through the port helps build the economic ground to assist ports undertake social and environmental responsibilities for the region.

For organisational sustainability, long term planning is the foremost building block (Alman 2011) that needs to be fixed for port sustainability. The national port strategy also identifies the necessity of long term planning (Infrastructure Australia 2010b). It is also a challenging but essential task for a port to update the long term plans (Baer 2009). The empirical results revealed that most Australian regional ports do not have a long term plan as is also reflected in the following quote:

> *As regional ports do not have long term plans, they do not link port to the road and rail networks, they do not have logistics chains organised … most of our regional ports are poorly performing and poorly functioning in terms of their own right and in terms of their land side and sea side logistics … (they) are not making profit … they are not financially sound*

> *... how these ports be economic leaders and bring benefits and serve the region. -TIP (Telephone Interview Participant) #08*

The reasons behind the absence of long term plans of Australian regional ports may include poor financial performance, the absence of in-house initiatives and planning capability, insufficient levels of collaboration resulting in supply chain efficiency not being achieved, lack of consultation and engagement with the port stakeholders particularly with local port community, and lack of leadership in ports.

5.2 Building collaborative advantage

Building collaborative advantage with other organisations in the region appears as another major theme for Australian regional ports to be better involved in regional development. The general themes underpinning this major theme include the ports' capability of being a network hub for exchanging information among concerned regional organisations, collaboration for supply chain efficiency, and participatory entrepreneurship with other regional businesses and organisations. The policy support for developing collaborative advantage is essential. A port can be pivotal in leading collaboration among the regional organisations.

Exchange of information is the backbone for collaboration. The interview results identified information generation, collection, and sharing among the regional port stakeholders, regional organisations and businesses as key elements for collaboration. Exchange of information may also support the societal inclusion of ports in the region. Societal and community engagement may accelerate rapid and correct exchange of information, increase social capital and generate support for economic development in the region. Some of the Australian regional ports have maintained the societal relation with their regions through sponsoring social and community events, media releases and radio broadcasts, and attending the community liaison committee. However, about 32% of the participants1, most of whom were other port stakeholders, stated that regional ports do not maintain sufficient societal and community relations with their regions possibly due to poor financial performance of ports, lack of leadership, or excessive non-commercial demand of the port stakeholders. Of interest is that some of the regional resource-based ports did not think it is necessary to maintain that relationship as they are quite remote from the society and community.

[1] Based on the participants' responses (binary scale-Yes/No) to the four quantitative short questions at the end of each interview. The short questions were on ARPs involvement in regional development, regional innovation system, societal and community relations, and leading role of port for regional innovation.

The efficiency of supply chains is a joint effort among the supply chain members where ports can be a collaborative platform. This was evidenced by the interview results as participants perceived ports as being an 'objective stakeholder' for their interest in overall supply chain efficiency and coordination, a 'demand modeller' for port sustainability and planning, and an 'economic strategist' and 'business catalysts' for the region, and also suggested that Australian regional ports can become a collaborative platform for supply chain efficiency. Further, the rising transport cost as a result of increasing fuel costs has increased political pressures for promoting efficient transport and logistics operations, which increasingly positions ports to play an important role in ensuring the efficiency of supply chains and in reshaping future supply chains (SCR, 2012). The collaborating platform should have characteristics such as exchanging information, sharing resources, and helping improve the capability of other organisations in the region to achieve a mutual benefit (Himmelman 2002). This mutual interest among the regional organisations and port stakeholders would then be a driving force behind the increasing supply chain efficiency in the region.

5.3 A port as an active participant in the RIS

Being an active participant in the RIS emerges as another major theme for Australian regional ports enforcing their greater involvement in regional development and recognising the necessity of proactive leadership in ports; entrepreneurship for regional innovation and regional competitive advantage; continued and systematic engagement with other regional entities; and utilising port's region-centric position for interactive learning and knowledge transfer among the regional entities.

The network leadership role of Australian regional ports can further be enhanced to support RIS (Cahoon et al, 2013) within the socio-economic, geographic and environmental matrix surrounding the port, and in supporting regional development activities. This graduation of a port's role can further be referred to as regional enabler. The port stakeholders also acknowledge the necessity of evaluating regional strengths and weaknesses in formulating port strategy and acknowledge ports as one of the organisations very familiar with the local knowledge, infrastructures, organisations, businesses relations and commercial objectives of businesses in the region. Figure 3 illustrates a conceptual model for ports' contribution to regional development in the context of Australian regional ports.

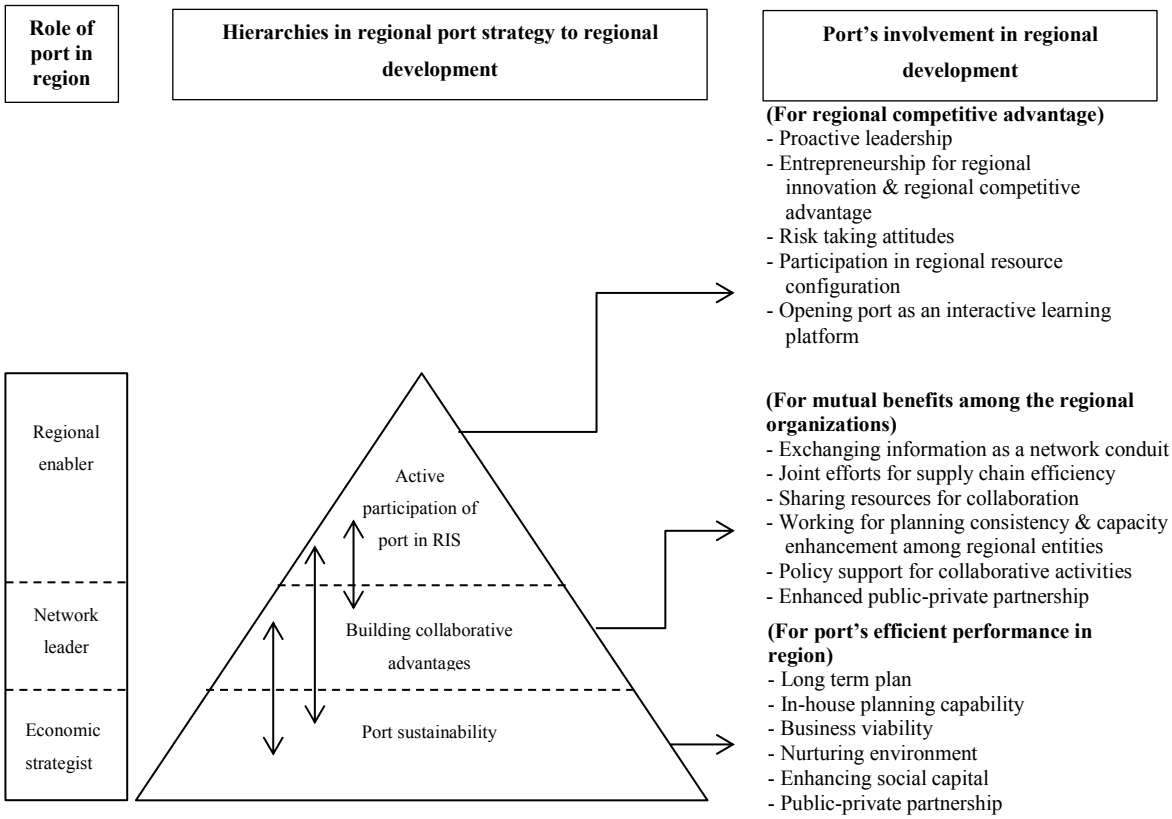


Figure 3: A conceptual model for ports' contribution to regional development

The ARPs are a key interface between the region and the market through supply chain networks. They may be better involved in regional development efforts during different phases of port's growth by serving regional customers, communities, and port stakeholders ensuring efficient port performance in the region, achieving collaborating advantages, and participating in activities related to systematic regional competitive advantage. The three hierarchies illustrated in the conceptual model which have been developed based on Australian regional port stakeholders' perspectives are plausibly correlated that is subject to further validation in Australian and international ports context.

6. Conclusion

The results of this study suggest that it is essential for the ARPs to initiate business strategies in the regional context to achieve port sustainability and contribute in regional development. The ARPs should play a pivotal role for the

regional development in which it is embedded. The role of the ARPs in their host regions as a gateway for export and import cargoes can further be evolved into a regional enabler. In order to capture regional opportunities the ARPs need to have an effective planning capability, fast and flexible approval procedure, efficient work force to implement the plans, and above all, the appropriate financial autonomy. As a crucial export-import gateway for the region, port sustainability is a minimum condition for ARPs to be involved in regional development. Collaboration with regional organisations and other port stakeholders can be the driving force to achieve mutual benefits, supply chain efficiency and optimal utilisation of regional resources. The ARPs' leading role in the network for information flow in the region would be the first step for building collaborative advantages. The port governance structure should be effective for ports' innovative activities along with necessary policy support. Enhanced and healthy public-private partnership in the port sector may provide a congenial atmosphere for innovative activities in order to attain regional competitive advantage leading to regional development. The symbiotic relationship of ARPs with their regions needs to be further strengthened by having enhanced community engagement, being proactive within the regional network, being strategic in planning consistent with other regional entities, and developing partnership with regional organisations for supply chain efficiency and regional competitive advantage.

Acknowledgements

The authors would like to thank the telephone interview participants for their valuable inputs to this study. The authors also acknowledge the useful advice on this paper from the anonymous reviewers.

References

ALMAN, D. 2011. Organisational Sustainability [Online]. Proventive Solutions. Available: http://proventivesolutions.com.au/media/Organisational%20Sustainability%20V5.pdf [Accessed 01 Feb 2013].

ASHEIM, B. 2007. Differentiated knowledge bases and varieties of regional innovation systems. Innovation: The European Journal of Social Science Research, 20, 223 - 241.

BAER, L. 2009. Port Infrastructure Development-Opportunities in these Challenging Times. AAPA Commissioners Seminar.

BAILEY, K. Year. Sustainable Port Communities. In: 1st Hemispheric Convention on Port Environmental Protection, July 22-25, 2009, 2009 Fox de Iguacu, Brazil. American Association of Port Authorities (AAPA).

BEER, A., MAUDE, A. & PRITCHARD, B. 2003. Developing Australia's regions: theory and practice, Sydney, Australia, University of New South Wales.

BICHOU, K. 2009. Port Operations, Planning and Logistics, London, UK, Informa.

BRANCH, A. E. 1986. Elements of Port Operation and Management, New York, USA, Chapman and Hall Ltd.

BRYAN, J., MUNDAY, M., PICKERNELL, D. & ROBERTS, A. 2006. Assessing the economic significance of port activity: evidence from ABP Operations in industrial South Wales. Maritime Policy & Management: The flagship journal of international shipping and port research, 33, 371 - 386.

CAHOON, S., PATEMAN, H. & CHEN, S.-L. 2013. Regional port authorities: leading players in innovation networks? Journal of Transport Geography, 27, 66-75.

CAHOON, S. C. 2004. Seaport Marketing: A Census of Australian Seaports. PhD, University of Tasmania.

CARBONE, V. & DE MARTINO, M. 2003. The changing role of ports in supply-chain management: an empirical analysis. Maritime Policy & Management, 30, 305-320.

CHEN, P., HAUGSTETTER, H., CAHOON, S. & MCCALL, T. 2010a. Constructing competitive advantage: Regional ports in local innovation systems-The case of Burnie port. Final Report. Launceston: Australian Maritime College.

CHEN, S.-L., CAHOON, S. & HAUGSTETTER, H. 2010b. A Regional Port's Role in Its Local Innovation System: The Regional Development Platform Method. 2010 Annual Conference of the International Association of Maritime Economists. Lisbon, Portugal.

COLLETIS-WAHL, K. & PECQUEUR, B. 2001. Territories, Development and Specific Resources: What Analytical Framework? Regional Studies, 35, 449 - 459.

COLLITS, P. 2004. Policies for the future of regional Australia. European Planning Studies, 12, 85 - 97.

COOKE, P., GOMEZ URANGA, M. & ETXEBARRIA, G. 1997. Regional innovation systems: Institutional and organisational dimensions. Research Policy, 26, 475-491.

COOPER, D. R. & SCHINDLER, P. S. 2011. Business Research Methods, New York, McGraw-Hill.

CRESWELL, J. W. & PLANO CLARK, V. L. 2011. Designing and conducting mixed methods research, Thousand Oaks, California, SAGE Publications.

DAMESICK, P. J. 1986. Service Industries, Employment and Regional Development in Britain: A Review of Recent Trends and Issues. Transactions of the Institute of British Geographers, 11, 212-226.

DE LANGEN, P. W. 2008. Ensuring Hinterland Access: The Role of Port Authorities. Discussion Paper No. 2008-11. OECD/ITF.

DENKTAS-SAKAR, G. & KARATAS-CETIN, C. 2012. Port Sustainability and Stakeholder Management in Supply Chains: A Framework on Resource Dependence Theory. The Asian Journal of Shipping and Logistics, 28, 301-320.

DOOMS, M. & VERBEKE, A. Year. Stakeholder management in ports: a conceptual framework integrating insights from research in strategy, corporate social responsibility and port management. In: Proceedings of the Annual Conference of the International Association of Maritime Economists (IAME), 2007 Athens, Greece.

DUCRUET, C. 2009. Port Regions and Globalization. In: NOTTEBOOM, T., DUCRUET, C. & LANGEN, P. D. (eds.) Ports in Proximity: competition and coordination among adjacent seaports. Surrey: Ashgate

DUCRUET, C. & ZAIDI, F. 2012. Maritime constellations: a complex network approach to shipping and ports. Maritime Policy & Management, 39, 151-168.

FUJITA, M. & MORI, T. 1996. The role of ports in the making of major cities: Self-agglomeration and hub-effect. Journal of Development Economics, 49, 93-120.

GAFFIKIN, F. & MORRISSEY, M. 2001. Regional Development - An integrated approach? Local Economy, 16, 63 - 71.

GHD 2010. The possible future market challenges for relevant ports. Background Paper 5 for the NPS. Canberra: Infrastructure Australia and the National Transport Commission.

GOSS, R. O. 1990. Economic policies and seaports: The economic functions of seaports. Maritime Policy & Management: The flagship journal of international shipping and port research, 17, 207 - 219.

GROBAR, L. M. 2008. The Economic Status of Areas Surrounding Major U.S. Container Ports: Evidence and Policy Issues. Growth and Change, 39, 497-516.

HALL, P. V. 2002. The Institution of Infrastructure and the Development of Port-Regions. PhD, University of California.

HALL, P. V. & JACOBS, W. 2010. Shifting Proximities: The Maritime Ports Sector in an Era of Global Supply Chains. Regional Studies, 44, 1103-1115.

HARALAMBIDES, H. E. 1997. Ports and Regional Development in Europe: A historical Perspective. Report submitted to the European Commission in the context of its preparation of the 'Green Paper on Ports and Maritime Infrastructure'.

HIMMELMAN, A. T. 2002. Collaboration for a Change: Definitions, decision-making models, roles, and collaboration process guide, Minneapolis, HIMMELMAN Consulting.

HINDS, A. A. 2008. Doing well by doing good: ports and the sustainability challenge. a PowerPoint presentation in AAPA Port Finance Seminar, June 10-12, 2008. Virginia: American Association of Port Authorities (AAPA).

HOUSE OF COMMONS TRANSPORT COMMITTEE 2007. The Ports Industry in England and Wales. Second Report of Session 2006-07. London: House of Commons, UK.

INFRASTRUCTURE AUSTRALIA. 2010a. National Ports Strategy [Online]. Canberra, Australia: Author. Available: http://www.infrastructureaustralia.gov.au/gateways/files/National_Ports_Strategy_DEC2010_v2.pdf [Accessed 5 October 2010 2010].

INFRASTRUCTURE AUSTRALIA 2010b. National ports strategy. Background paper. Canberra, Australia: Infrastructure Australia and the National Transport Commission.

INFRASTRUCTURE AUSTRALIA. 2011. National Land Freight Strategy [Online]. Canberra, Australia: Author. Available: http://www.infrastructureaustralia.gov.au/publications/files/NLFS_220211.pdf [Accessed 27 January 2012 2012].

INFRASTRUCTURE PARTNERSHIPS AUSTRALIA 2009a. Meeting the 2050 Freight Challenge, a discussion paper prepared by PricewaterhouseCoopers Australia. Sydney, Australia: Infrastructure Partnership Australia.

INFRASTRUCTURE PARTNERSHIPS AUSTRALIA 2009b. Submission to Infrastructure Australia on the National Ports Strategy. Canberra, Australia: Infrastructure Australia.

JUNG, B.-M. 2011. Economic Contribution of Ports to the Local Economies in Korea. The Asian Journal of Shipping and Logistics, 27, 1-30.

MANGAN, J. & CUNNINGHAM, J. 2000. Irish ports: commercialisation and strategic change. Business Strategy Review, 11, 51-60.

MAS-VERDU, F., RIBEIRO SORIANO, D. & ROIG DOBON, S. 2010. Regional development and innovation: the role of services. The Service Industries Journal, 30, 633 - 641.

MCCALLA, R. J. 1999. Global change, local pain: intermodal seaport terminals and their service areas. Journal of Transport Geography, 7, 247-254.

MCLAUGHLIN, H. & FEARON, C. 2013. Understanding the development of port and regional relationships: a new cooperation/competition matrix. Maritime Policy & Management, 40, 278-294.

MOGLIA, F. & SANGUINERI, M. 2003. Port Planning: the Need for a New Approach? Maritime Economics & Logistics, 5, 413-413-425.

MOULAERT, F. & MEHMOOD, A. 2010. Analysing Regional Development and Policy: A Structural–Realist Approach. Regional Studies, 44, 103 - 118.

NERMEND, K. 2009. Vector Calculus in Regional Development Analysis. Comparative Regional Analysis Using the Example of Poland. Berlin: Physica-Verlag.

NEWLYN, R. Year. A National Strategy for Australian Port Development. In: WA Port Authorities Conference (presentation slides), 2009 Sydney, Australia. Maritime Union of Australia.

NOTTEBOOM, T. 2009. Path Dependency and Contingency in the Development of Multi-port Gateway Regions and Multi-port Hub Regions. In: NOTTEBOOM, T., DUCRUET, C. & DE LANGEN, P. (eds.) Ports in Proximity. Surrey, England: Ashgate Publishing Limited.

NOTTEBOOM, T., DUCRUET, C. & DE LANGEN, P. W. (eds.) 2009. Ports in Proximity, Surrey, England: Ashgate Publishing Limited.

NOTTEBOOM, T. & RODRIGUE, J.-P. 2007. Re-assessing port-hinterland relationships in the context of global commodity chains [Online]. New York, USA: Hofstra University. Available: http://people.hofstra.edu/Jean-paul_Rodrigue/downloads/Ashgate-Notteboom-Rodrigue-draft%20final.pdf [Accessed 12 August 2011].

NOTTEBOOM, T. E. & RODRIGUE, J.-P. 2005. Port regionalization: towards a new phase in port development. Maritime Policy & Management, 32, 297-313.

NOTTEBOOM, T. E. & WINKELMANS, W. Year. Stakeholder Relations Management in Ports: Dealing with the Interplay of Forces among Stakeholders in a Changing Competitive Environment. In: International Association of Maritime Economists (IAME) 2002, 2002 Panama City.

OECD. 2011. Regional Development [Online]. Directorate for Public Governance and Territorial Development, The Organisation for Economic Co-operation and Development (OECD). Available: http://www.oecd.org/document/62/0,3343,en_2649_34413_36878654_1_1_1_1,00.html [Accessed 02 February 2011 2011].

PANAYIDES, P. M. & SONG, D.-W. 2009. Port integration in global supply chains: measures and implications for maritime logistics. International Journal of Logistics: Research & Applications, 12, 133-145.

PETTIT, S. J. & BERESFORD, A. K. C. 2009. Port development: from gateways to logistics hubs. Maritime Policy & Management: The flagship journal of international shipping and port research, 36, 253 - 267.

RIETVELD, P. 1989. Infrastructure and Regional Development- A Survey of Multiregional Economic-Models. Annals of Regional Science, 23, 255-274.

RODRIGUE, J.-P., COMTOIS, C. & SLACK, B. 2013. The Geography of Transport Systems. Routledge.

RODRIGUE, J.-P. & NOTTEBOOM, T. 2010. Foreland-Based Regionalization: Integrating Intermediate Hubs with Port Hinterlands [Online]. New York, USA: Hofstra University. Available: http://people.hofstra.edu/Jean-paul_Rodrigue/downloads/Foreland-based%20regionalization_IFSPA-final.pdf [Accessed 12 August 2011].

RODRIGUE, J. P. 2003. The Port Authority of New York and New Jersy: Global Changes Regional Gains and Local Challenges in Port Development.

SANDELOWSKI, M. 2003. A framework for analyzing data in mixed methods research. In: TASHAKKORI, A. & TEDDLIE, C. (eds.) Handbook of Mixed Methods in Social & Behavioral Research. Thousand Oaks, CA: SAGE Publications.

SCR. 2012. Port-centric supply chains the future [Online]. SupplyChainReview. Available: http://www.supplychainreview.com.au/news/articleid/81648.aspx [Accessed 01 Jan 2013 2012].

SORENSEN, T., MARSHALL, N. & DOLLERY, B. 2007. Changing Governance of Australian Regional Development: Systems and Effectiveness. Space and Polity, 11, 297 - 315.

UNCTAD 1996. Potentialities for Regional Port Cooperation. Report by the United Nations Conference on Trade and Development (UNCTAD). New York: United Nations Publication.

UNESCAP 2002. Commercial Development of Regional Ports as Logistics Centres. Study report by UN Economic and Social Commission for Asia and the Pacific (UNESCAP). New York: United Nations.

UNESCAP 2005. Regional Shipping and Port Development Strategies. Managing Globalization - a monograph series by UN Economic and Social Commission for Asia and the Pacific (UNESCAP). New York: United Nations.

VAN DER LUGT, L. & DE LANGEN, P. W. Year. Port authority strategy: Beyond the landlord- a conceptual approach. In: IAME 2007, 2007 Athens. IAME.

VERHOEVEN, P. 2010. A review of port authority functions: towards a renaissance? Maritime Policy & Management: The flagship journal of international shipping and port research, 37, 247 - 270.

VLEUGELS, R. L. M. 1969. The Economic Impact of Ports on the Regions They Serve and the Role of Industrial Development. 6th Biennial Conference of the International Association of Ports and Harbors. Melbourne, Australia.

WINKELMANS, W. & NOTTEBOOM, T. 2007. Port master planning: Balancing stakeholders' interests. In: DOBROWOLSKI, K. & ZUREK, J. (eds.) The reality and dilemmas of globalization. Gdansk: The Foundation of the Development of Gdansk University.